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Electric Alloy Steels Made on Tonnage Basis

Steel Plant and Rolling Mill of the Latrobe
Electric Steel Company, Producing Ball-
Bearing, Die, Magnet and High-Speed Steels

LARGE scale production of alloy steels by means of the electric furnace—a notable development in the steel industry—was undertaken some months ago by the Latrobe Electric Steel Company. In fact the company was formed for the purpose. It was held by those who promoted the enterprise that the electric furnace of generous proportions had found itself and that general conditions of price and demand warranted a venture of the kind and relative magnitude. As a result, its works, at Latrobe, Pa., not far from Pittsburgh, has been engaged all this year in quantity manufacture, not only of alloy steels, such as go into ball-bearing parts and into automobile construction, but of high-speed

metal-cutting and special alloy steels for various purposes.

As a nucleus for the present works possession was secured of a foundry plant in outlying Latrobe, on a branch of the Ligonier Valley Railroad. This had a 6-ton electric furnace, for making electric steel castings, but the accompanying plan of the works shows how the plant has been converted into a conveniently arranged steel-making plant and rolling mill. The accompanying reproductions of photographs will convey an impression of the scale of operations. The capacity of the plant may be put at 65 tons per day, or 20,000 tons per year.

The plant has now two 6-ton Heroult electric

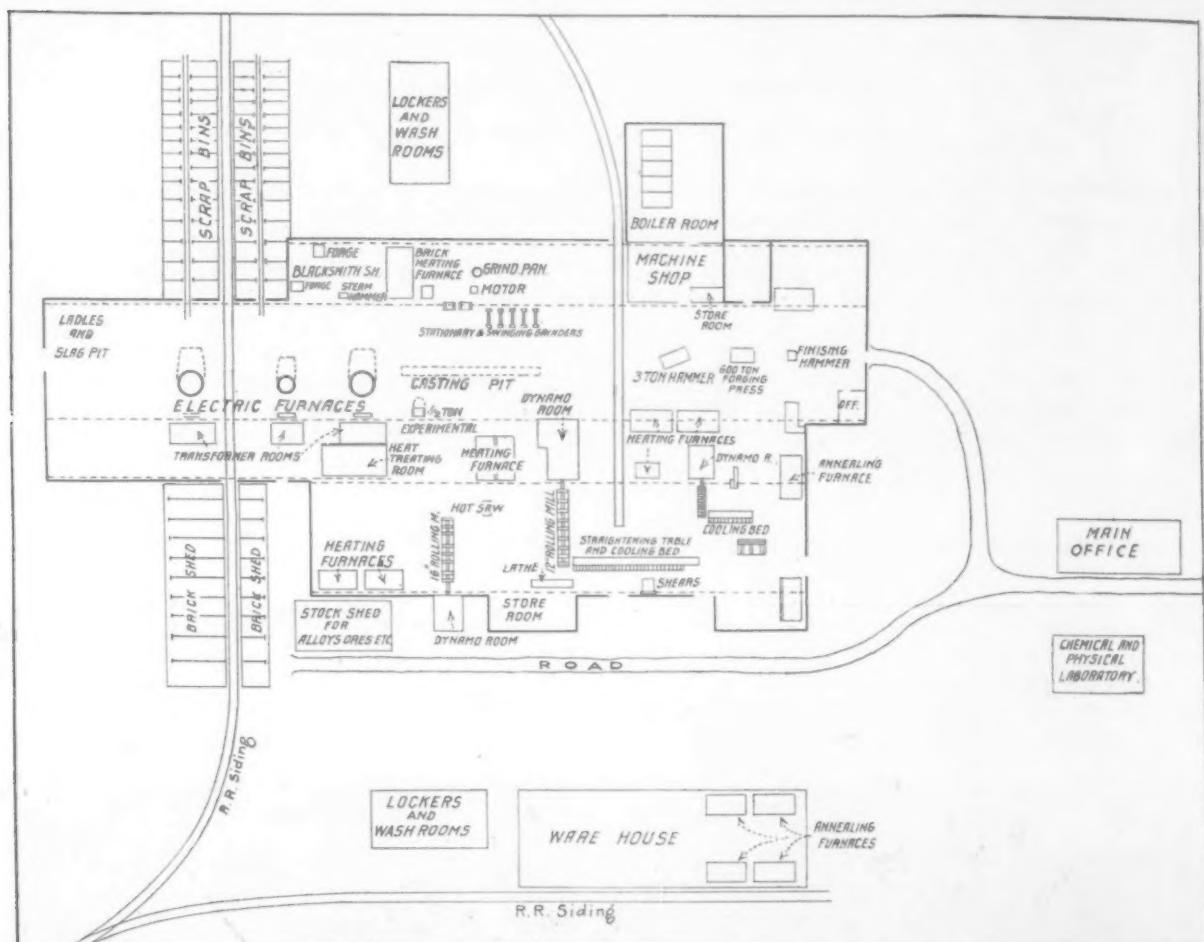


Removing First Refining Slag from 3-Ton Furnace

furnaces and one of 3-tons capacity, as well as a 1-ton experimental electric furnace. The major part of the output goes into chrome, chrome-nickel and chrome-vanadium steels, but high-speed steel is a conspicuous article of manufacture marketed under the name of Electrite, as for example Electrite No. 1, Electrite No. 2 and Electrite-Uranium A,—but the company has developed a number of special brands, including a non-shrinking die steel, known as Mangano; Renow steel, suitable for wire drawing dies; steels for hot punching work, such as Electrite No. 4, which is a medium high chrome-tungsten steel, and Select, a high-chrome steel, and a tungsten permanent magnet steel. A 12-in. and a 16-in. rolling mill constitutes the finishing end of

yond the lean-to containing the transformers for the furnaces and the different heating furnaces is the rolling mill proper, all departments in direct communication and bringing the main manufacturing departments virtually all under one roof.

At the time of the visit to the Latrobe plant sufficient figures were not available to give a comprehensive idea of the performance of the steel-making plant. An idea of the materials used, selected at random from furnace charging sheets show that for making a steel running about 0.98 per cent carbon, 0.3 per cent manganese and 0.35 per cent chromium, the charge would be made up about as follows: Pig iron, 1300 lb.; punchings, 2800 lb.; tool scrap, 2200 lb.; drop forging trim-



General Plan of Works of Latrobe Electric Steel Company

the plant, which can produce rounds from 3/16 to 5 in. in diameter; squares from 1/4 to 4 3/4 in. on the side, and flats from 9/32 x 1/4 in. to 1 x 8 in.

The electric furnaces lie along the center line of the main or original foundry building, which is 60-ft. wide and of lofty proportions, and they are located toward one end, as indicated in the accompanying plan, with the scrap-bins nearby. A railroad siding brings the scrap cars alongside the bins and narrow-gage tracking provides for carrying to the funaces the charges made up from the material in the different bins. The bins are covered for protection from the elements, and a similar group of bins, reached also by the railroad siding, provide for the storage of bricks and other materials for the furnaces. This main part of the works has lean-tos, 30-ft. wide, on each side, but longitudinal as well as lateral extensions were made, and an extension to the main bay gives space for building up spare tops of the furnaces and for storing and lining ladles and accommodating the slag. Be-

tings, 7000 lb. Similarly, the composition of the charge for steel made in one of the larger furnaces, to run, say, 1.06 per cent carbon, 0.32 per cent manganese and 1.38 per cent chromium would be about as follows: Pig iron, 2150 lb.; chromium scrap, 2500 lb.; carbon scrap, 1000 lb.; drop forging trimmings, 1000 lb.; punchings, 6350 lb.; chromium trimmings, 1000 lb.; limestone, 600 lb. and burnt lime, 200 lb.

The steel is cast in split molds, 4 to 14-in. in diameter, and hot refractory tops are used. For breaking down the ingots a 3-ton steam hammer, a 600-ton Mesta high speed steam forging press are provided, and a 2500-lb. and an 800-lb. Chambersburg finishing hammer are also included in the equipment. The stripped ingots are heated in coal-burning furnaces near the hammer and the press as indicated. Each of these furnaces is of three-door size and is equipped with steam-jet burners. For handling the ingots in and out of the furnace a swiveling post crane is employed. As ordinarily

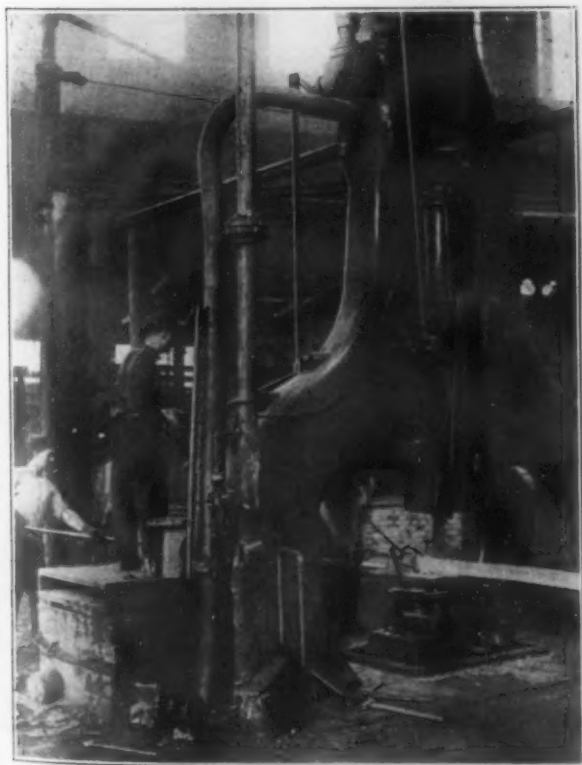


Pouring Electric Furnace Steel from 10-Ton Ladle

operated the forged ingot is cut in the middle into two billets. Before passing into the heating furnaces of the rolling mills, the billets are, of course, ground on the surface wherever folds, slivers or other blemishes are discernible, and for the etching processes there is a group of stationary and swinging grinders of a type, individually motor-driven, seen in foundry cleaning rooms. The steel-making

department is commanded by two electric traveling cranes, one of 10-tons capacity and the other a 15-ton Niles crane.

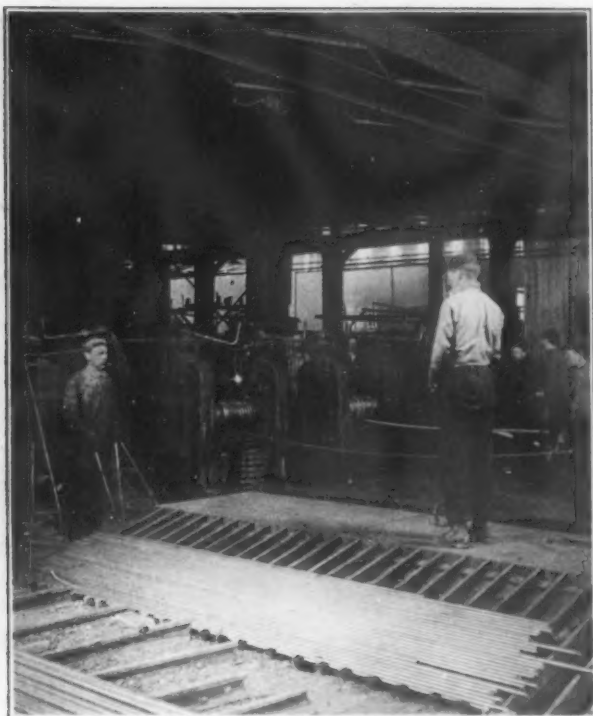
The arrangement of the rolling mills shows the five stands of the three-high 12-in. mills with the heating furnaces nearby and the 16-in. three-high mill, which is of three stands. Both mills are electrically driven. The 12-in. mill is driven by two



Three-ton Forging Hammer



Working on 600-Ton Forging Press



Rolling Round Bars on 12-In. Mill

direct-current motors coupled together with their common shaft in a continuation of the shaft of the mill. They are operated from a 300-kw. rotary converter and the speed control allows for variations of 70 to 200 r.p.m. It is probable that the two motors together develop 400 hp. The 16-in. mill is driven by a link-belt chain from a 450-hp. Allis-Chalmers motor with a flywheel 24-ft. 4-in. in diameter. The speed reduction through the link belt is from 440 to 70 r.p.m. and the chain drive, which is 30 in. wide, was used to allow for a short distance between the motor and mill shaft centers.

Overhead light trolleys provide for bringing the billets from the billet-heating furnaces to the mills, but the rolling mill is also served by a 3-ton Euclid Crane & Hoist Company's traveling bridge controlled from the floor. The 12-in. mill delivers a product from the smaller sizes up to $3\frac{3}{4}$ in. diameter in the case of rounds and to $5 \times \frac{1}{2}$ -in. in the case of the flat bars. In octagonal and hexagonal shapes the top size is equivalent to about $1\frac{1}{2}$ -in. hexagons. The 16-in. mill produces from 2-in. rounds upward to the maximum sizes already mentioned.

A railroad track entering the rolling mill toward the finishing end provides for the ready delivery of products by direct railroad shipment, and a wagon road gives facilities for automobile truck transportation. A warehouse is, however, in course of construction for storing stocks of the various standard products of the company and a railroad siding will here accommodate shipment. In this building is to be a heat-treating department, with gas furnaces and oil, brine and fresh water for quenching. A completely equipped laboratory for scientific investigation and research work forms an important part of the plant. It is equipped with testing machines for the examination of physical characteristics and a special heat-treating plant is included.

The finishing equipment in the rolling mill includes an annealing furnace, and special tube containers allow for packing the bars to be annealed against exposure to atmospheric influences within the furnace. Besides two Garrison hot saws for the 16-in. mill, and two Abramsen straighteners and

a polisher and a straightener for flat bars are provided.

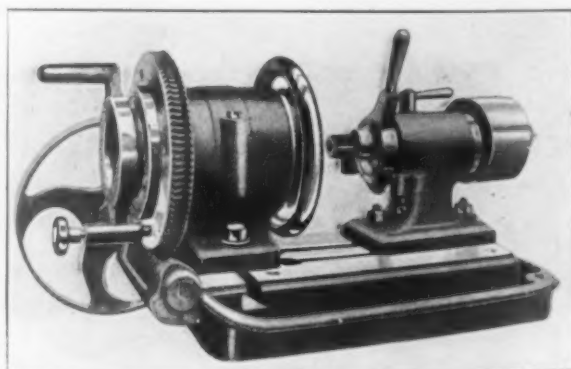
Electric current for the furnaces, mill motors and for lighting is purchased, but for steam for the hammers a battery of Erie City Iron Works boilers was installed. A machine shop with the usual machine tools, motor-driven, and including an Ingersoll-Rand compressor for air blowing of scale at the forging hammers as well as for general use around the plant, was a part of the original equipment. The grinding pan of the former foundry is utilized for mixing materials, as for making the hot tops, which are molded on a jarring machine.

The leading figure of the company is E. T. Edwards, formerly of the Firth-Sterling Steel Company and latterly president of the Vanadium Alloys Mfg. Company at Latrobe. He is vice-president and manager of the Latrobe Electric Steel Company. M. W. Saxman, a coal operator and banker of Latrobe, is president and Ira B. Schallenberger, banker, of Latrobe, is secretary and treasurer. Frank Garrett, formerly with the Firth-Sterling Steel Company, is metallurgist. Charles W. Gutzzeit is sales manager of the New York office at 165 Broadway.

Screw Thread Milling Machine

A machine specially designed for cutting the threads in shrapnel shells, and one which it is said has been extensively used in France and has lately been introduced into Italy for a similar purpose, is shown in the accompanying illustration. The thread cutter is fixed to the shaft of the holder by means of a cross pin and the holder itself is held over its whole length inside the tail stock, to minimize vibration and consequently secure accurate working. The cutter revolves at a speed of 150 r.p.m. and is driven the exact depth to be threaded.

The threads are cut once and for one revolution of the shell. While the shell completes this revolution, the chuck which holds it advances inside the head stock against the cutter by the action of a lead screw. The shell is held fast in the chuck by means of a hand wheel which acts upon a vice. No spanner or other special tool is required, and no loss of time results on this account. One man attends two machines and the threading of one shell takes about three minutes. The



Screw Thread Milling Machine of a Design Extensively Used Abroad

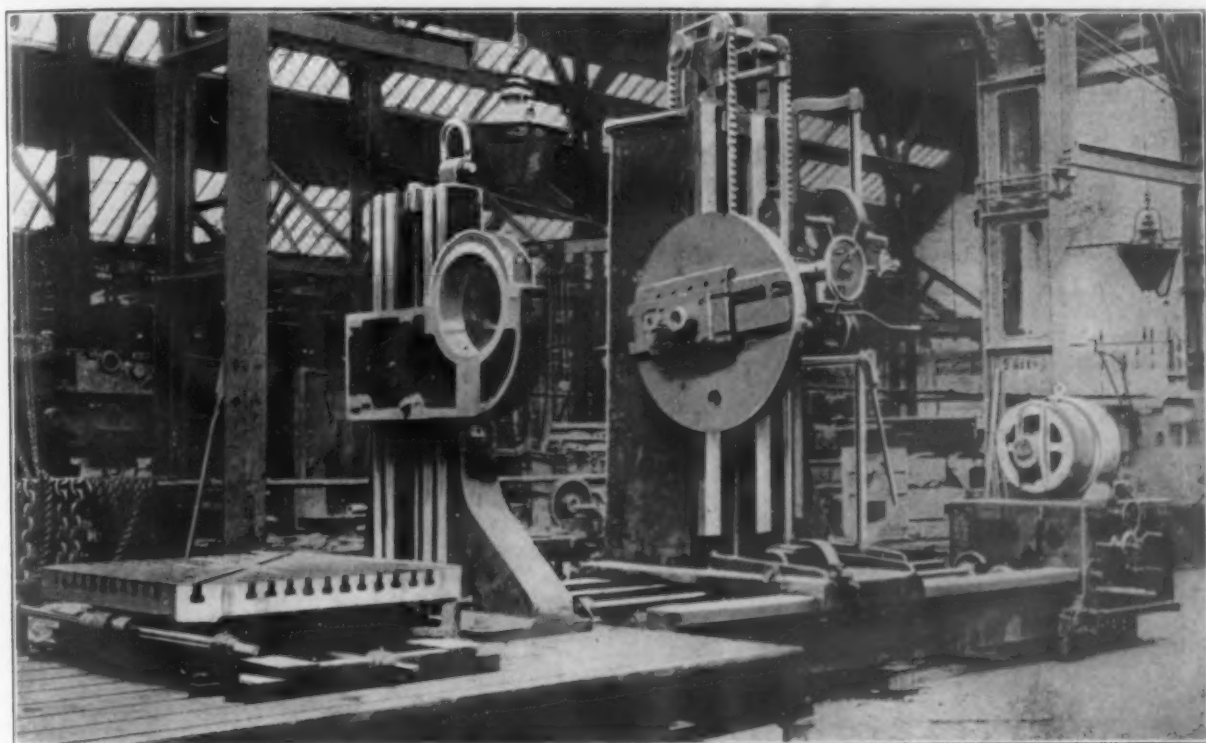
machine may, of course, be placed upon a pedestal base. It is built in Switzerland but London *Engineering*, which has illustrated it, secured particulars from the Imperial Motor Industry, Ltd., 11 Denmark Street, Charing Cross Road, London, W. C.

Industrial accidents in Pennsylvania in August killed 246 workers and injured 23,817, according to figures just announced by John Price Jackson, Commissioner of Labor and Industry. This is the greatest number of accidents in any month this year.

A Large Horizontal Boring Machine

A horizontal boring machine of large proportions designed for general work has been built by G. & A. Harvey, Ltd., Albion Works, Glasgow, Scotland. From a brief description in *Engineering*, of London, the following particulars are obtainable and one of the photographic illustrations, showing the machine ready for operation, is here reproduced.

The machine proper with the spindle driving mechanism or standard has a bed $14\frac{1}{2}$ ft. long and 6 ft. $10\frac{1}{2}$ in. wide, and to one end of this is bolted the table for the work, the table measuring 13 ft. 9 in. by 34 ft. The standard on the main bed is provided with self-acting feed and in addition power traverse and hand adjustment in either direction, and it can be locked in any position. The length of traverse is 7 ft. 6 in. The saddle carried by the standard is balanced for vertical movement, and it has a vertical travel of 5 ft. 6 in., the center of the spindle in the lowest position being 2 ft. 4 in. and the highest 7 ft. 10 in. above the top of the table.



Large Horizontal Boring Machine Built by G. & A. Harvey, Ltd., Glasgow, Scotland

The spindle is of cast iron revolving in gun-metal bearings. The front journal is 10 in. and the back journal $5\frac{1}{4}$ in. in diameter. The spindle is driven from a 40-hp. motor on a cast-iron box fixed to the end of the main bed. The drive is altogether by gears to the shaft in the bed and thence by bevel gears and vertical shaft to a horizontal shaft in the saddle. The saddle is fitted with speed gears, giving twelve changes in all for the spindle. Its maximum speed is 23 r.p.m. and the minimum speed 0.3 r.p.m.

The spindle drive is fitted with reversing gear on the saddle, so that the chuck may be revolved in either direction. The chuck is 53 in. in diameter and carries a tool slide on one side. The facing slide is placed on the front of the chuck in adjustable vees and has a sub-acting feed or hand travel of 33 in. The facing tool will operate on any part of a surface from the center of the spindle to 66 in. diameter.

The work-plate is provided with a table 7 ft. square and is capable of being revolved by hand through worm and worm-wheel, and locked in four right-angle positions. The table is carried in a cross-slide which is bolted securely to the work-plate in any position longitudinally. The cross adjustment of the table is over 3 ft.

Casting High-Explosive Shells

The method of casting and forging 8-in. high-explosive shells is described in *Canadian Machinery*, July 27, 1916. The plant uses a 20-ton charge made up as follows: Pig iron, 7000 to 7500 lb.; shell head scrap, 13,000 lb.; plate scrap, 7600 lb.; crop ends of ingots, 11,000 lb.; iron ore, silicon and manganese to bring the charge to 38,000 to 42,000 lb. About 75 per cent of the pig-iron charge is first placed in the furnace, and when this begins to settle the shell and plate scrap and the crop ends are added. The remainder of the pig iron is added after these have become partly melted. From $4\frac{1}{2}$ to 5 hr. is required to melt the charge, and another hour elapses before it is ready to tap. The tapping condition of the charge is determined by the fracture of a test bar. No chemical analysis is made until after the metal has been poured into molds.

The metal is tapped into a 20-ton ladle, which will fill about 120 8-in. molds or 360 4.5-in. molds. The metal is poured very hot for the 4.5-in. molds to avoid

any possibility of its freezing. The top surface of each ingot is covered with floor sand as it is poured in order to retain the heat and to aid in the feeding of the metal as the billet solidifies.

After cropping, the billets are placed 15 at a time in an oil-burning furnace and heated to 2100 deg. Fahr., requiring $1\frac{1}{4}$ to 2 hr. This time may be lengthened somewhat if the analysis shows the billets to be high in carbon. The billets are forged in a 350-ton Wood forging press the capacity of which is approximately 450 shells per day of 24 hr. To maintain this production 15 shell-heating furnaces are necessary. To insure satisfactory operation of the forging process, scale is removed from the billet by scrapers, which is necessary not only for the preservation of the dies but also for the uniform drawing of the shell. Were this not done, the adherence of the scale would have a tendency to produce a shell with eccentric walls.

The W. H. Mullins Company, Salem, Ohio, has completed a large three-story factory building as an addition to its plant. The building was formally opened Aug. 26 by a reception and entertainment, which was attended by over 4000 guests.

Normal Fracture of Good Malleable Iron*

The Effect of Haphazard Fractures and the Burning Out of Surface Carbon—An Erroneous Theory Regarding the Strength

BY ENRIQUE TOUCEDA

I HAVE seen very few photographs of fractures of malleable iron that have been made with the object of obtaining one of good iron, and all that I have seen have either shown the fracture of a test lug that had been hammered off a casting, the fracture of a test piece, or of a casting that had been broken transversely. Such fractures are made complex because failure takes place due to the influence of both tension and compression stresses, these being of varying intensity depending upon their distance from the neutral axis. While it is a fact that failures in castings of any kind, in the majority of cases, are due to loads that produce bending, torsion or both, still I believe this subject can be more accurately approached by a study of

edge of the compression side, the whiteness being less in evidence as the neutral axis is approached, because, as stated, the compression stresses are of varying intensity, and the crystals furthest from the neutral axis are flattened much more than those nearer to it. Fractures that have been produced by transverse stress will always show a silvery white area on the compression side, starting faintly to one side of the neutral axis and growing deeper as the edge is approached.

It is clear, therefore, that if we want to ascertain the appearance of the fracture of malleable iron it is desirable to see what its fracture looks like when the metal in the entire section has been subjected to the same treatment as would be the case

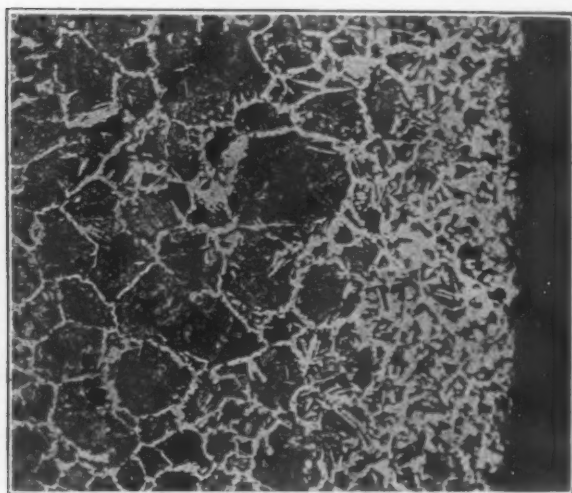


Fig. 1—Photomicrograph of a Piece of Steel Showing the Difference Between Skin and Core

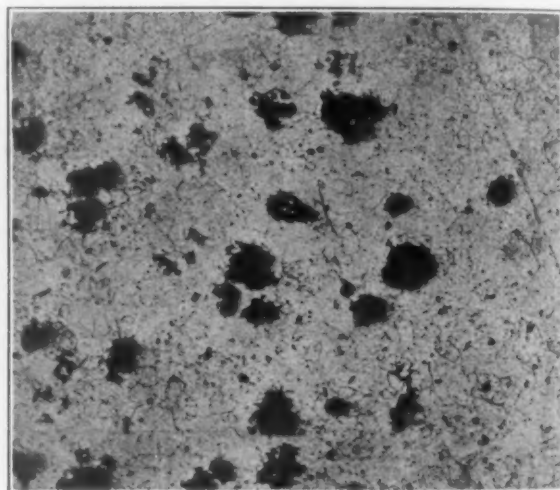


Fig. 2—Photomicrograph of the Structure of Decarbonized Border and Core of a Tensile Test Bar of Malleable Iron

fractures that have been produced through the sole action of a direct pull, as in making tension tests.

EFFECT OF HAPHAZARD FRACTURES

It is evident that if a crystal of pure iron is compressed and flattened out, its subsequent ability to elongate when pulled is greatly reduced. Consequently, when the lug is struck side blows in order to knock it off the casting, numerous shiny particles on the tension side of the fracture will be seen, because the ductility of the crystals has been greatly lessened by the compression which they previously sustained and they will, when subjected to a pull, part through the slip bands instead of stretching. This leaves facets that will sparkle, so that the tension side of the fracture will have an abnormal appearance, be the material good, bad or indifferent, as compared with what the fracture of these respective grades would show if subjected to transverse or tensile stress only.

When malleable iron is broken transversely, the metal on one side of the neutral axis is of course in compression, and in any quality of malleable it will always appear silvery white at the extreme

in a tension test. The structural composition of malleable iron consists simply of two constituents, including about 98 per cent, by weight, of ductile iron practically free from carbon, and about 2 per cent of small rounded particles of graphitic carbon uniformly distributed throughout this mass of iron, except within the decarbonized border.

SURFACE CARBON BURNED OUT

It is well known that it is not possible to heat a steel casting, a steel billet, or a malleable iron casting in the oxidizing gases of a furnace without removing a great deal, if not all, of the carbon from the metal for a certain depth under its surface. In commercial practice this depth will vary anywhere from a 1/32-in. to a 1/16-in. As steel contains no graphitic carbon the fracture of a broken piece will be uniform in appearance throughout, and the characteristics of the fracture can best be described by the accepted term "steely." The microscope, however, will disclose the fact that there is very much less carbon in the nearly decarbonized ring of metal referred to, than in the core which it encircles.

The reason, that when the fracture is examined by the eye, the border is similar in appearance to the core in the case of steel is due solely to the

*From a paper presented Sept. 14, 1916, at the American Foundrymen's Convention in Cleveland, Ohio.

fact that the appearance of the steel fracture does not depend upon carbon percentage, unless the amount of carbon between the steels that are being compared varies greatly. For instance, the fracture of a 0.10 per cent carbon steel would look about the same as one that contained 0.40 per cent carbon. A polished and etched section, however, when viewed under the microscope shows that a great difference exists between the two, which can be plainly seen by reference to Fig. 1, enlarged 60 diameters. This shows the difference in structural composition between the skin and core of a piece of steel that was $\frac{3}{8}$ in. thick.

Even in the case of the very best malleable iron the eye easily distinguishes the difference in appearance between the decarbonized border and the metal it surrounds, because the former is practically carbonless and looks steely, while the latter is dotted with numerous particles of graphitic carbon causing the metal to look dark. Consequently, due to contrast, the border is plainly visible.

In Fig. 2, which is enlarged 60 diameters, can be seen both the structure of the decarbonized border and the core, as it is misleadingly called, of a section taken from a tensile test bar. The skin is practically free from carbon, while the little particles of graphitic carbon can plainly be seen distributed with great uniformity throughout the iron of the core. You are aware that any commercial iron product containing but little combined carbon must of necessity be ductile, and as good malleable iron contains but little, if any, it must be ductile material.

AN ERRONEOUS OPINION

I have dwelt upon this matter because there appears to be an erroneous opinion, first, in connection with the characteristics of the border or skin of malleable iron; second, because of the common belief that a decarbonized border or skin is unique in malleable iron and not present in steel, owing to its invisibility in the fracture; third, because the skin must be taken into account in considering the fracture of malleable iron, and fourth, because this so-called skin can in the case of inferior malleable iron be of itself an explanation of its inferiority.

In the fracture of good malleable iron when broken by direct tension, or when it fails due to a steady, direct pull, the crystalline grains of iron, when the elastic limit has been reached, start to elongate permanently. As the test proceeds, they stretch further and become thinner, and just prior to fracture they become tapered down to a point.

The fracture then has what is known as a "tooth," because its surface is made up of an innumerable number of spines that have resulted from the elongation of the numerous grains in the metal. That part of the fracture encircled by the decarbonized ring appears to be of a dark gray color. This is due in part to the presence of small particles of graphitic carbon and in part to the shadows that are cast by the spines of the elongated grains. The skin, or border, looks white, due in part to the fact that no graphitic carbon is present and in part to light reflection. When the bar fails, the metal in the border being slightly more ductile, breaks last and at an angle, and consequently, when the light shines directly on the fracture of the core, it shines obliquely on the surface of the border. If, however, the bar is held obliquely to the direction of the light, a very fine silky sheen will be seen that varies in shade from a silvery gray to darker shades of the same color, as the obliquity of the fracture

to the light is decreased. Such will always be the appearance of the fracture of a tensile test bar of good malleable iron when the fracture is held in the various positions described.

If a bar is broken transversely, then the part that failed in tension should show, in a large measure, the characteristics covered by the foregoing description, while the part that was in compression would have the whitish looking area already referred to, and the more ductile the metal the greater will be the depth of this area.

STRENGTH NOT DUE TO THE SKIN

Only a few years ago such fractures as are shown in Fig. 3 were considered typical of what



Fig. 3—Appearance of the Fracture of Black Heart Malleable Iron

the fracture of good malleable iron should be, and it is actually due to such fractures that malleable iron made in this country received the name "black heart." Such iron as this is defective, as the border instead of being decarbonized, contains considerable carbon in the combined form. As a matter of fact it is a steel, and consequently is more brittle than the core. When good malleable breaks in tension the core parts first, as must be the case if its ductility is slightly less than the metal in the skin. This fact alone is sufficient to prove that those who have claimed that the strength of malleable iron lies mostly in the skin are misled. In the case of material whose fracture is similar to that shown in Fig. 3, the skin breaks first, as it is more brittle than the core.

Direct Production of Iron-Nickel Alloys

To avoid the separate extraction of iron and nickel, or iron and any other metal, such as manganese, from an ore when it is possible to obtain a desirable alloy by direct reduction, Frederick A. Eustis of Milton, Mass., and Charles P. Perin of New York have taken out a patent (U. S. 1,185,187—May 30, 1916) for the direct production of such alloys. Taking Cuban ore as an example, containing about 1 per cent nickel, a parcel of ore is divided into two parts, one of which is to be treated for the extraction of a predetermined amount of its nickel, which is subsequently added to the second part, thereby enriching the mixture in nickel, whereupon the mixture is smelted to produce an iron-nickel alloy. The treatment of the first part of the ore for extraction of nickel may be accomplished by roasting with sulphur-bearing material, yielding a sulphated product from which nickel sulphate can be leached. The nickel solution thus obtained may be precipitated, and the precipitate added to the second part of the ore prior to smelting. Various modifications of the method are given.

The Efficiency Society will hold a fall convention in New York City on Nov. 16, 17 and 18. It plans to discuss the question, "After the War, What?" To prevent the meetings having a political aspect, the dates mentioned were selected. It is proposed to invite wage-earners as well as representatives of the industries of the country.



Fig. 1—Photomicrograph of a Sample from Ingot No. 1, Unetched and Magnified 50 Diameters

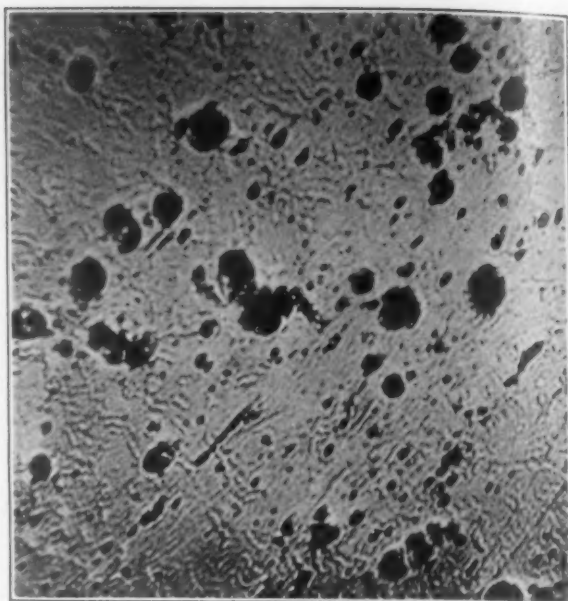


Fig. 2—Photomicrograph of the Same Steel as Fig. 1, Unetched and Magnified 180 Diameters

Converter Steel Castings Low in Manganese

Unusual Effect of Attempts at Economy by Reducing the Ferroalloy Additions—A Peculiar Slag Contamination

—BY EDWIN F. CONE—

WHEN the scarcity and high price of ferromanganese some months ago threatened serious inconvenience to steelmakers, attempts were made to find substitutes or at least to cut down the amount consumed. In some cases success attended these efforts, especially in open-hearth practice where high-grade ferrosilicon or spiegeleisen was an effective agent in partly deoxidizing the steel and furnishing some of the manganese. In converter practice and in converter foundry practice in particular, these efforts were

not so successful. One instance of this was brought to the writer's attention and the circumstances attending it are unusual and interesting.

It had been the custom of a prominent Eastern side-blow converter steel foundry to obtain its desired manganese content by adding ferromanganese. When the scarcity was acute it was decided to lower, by 50 per cent or more, the amount that had been added. Supplies were low, the prospects of obtaining more poor and the prices \$400 to \$450 per ton. It was not long before serious difficulties



Fig. 3—Photomicrograph of a Sample from Ingot No. 2, Unetched and Magnified 50 Diameters. The poor quality of the metal in this and Fig. 1 is evident



Fig. 4—Photomicrograph of the Same Steel as Fig. 3, Etched with Picric Acid and Magnified 500 Diameters. Blow Holes (the Large Black Spot) and Manganese Sulphide Are Visible

were encountered where formerly excellent results had been the rule.

The most serious and striking result of the reduced manganese charge was the periodical appearance in the metal, as it flowed from the ladle, of a slag-like agglomeration all through it, sometimes in sufficient mass to completely stop up the ladle's nozzle and hang like an icicle therefrom. It did not float to the top of the metal like a normal slag. The castings from many heats, especially when this phenomenon occurred, were not only more than usually blowy, but were permeated with slag-like inclusions, sufficient to cause their rejection at once on machining. A chemical examination of the slag-like agglomeration gave the following results:

	Per Cent		Per Cent
Silica	67.76	Magnesia	None
Oxide of iron.....	22.86	Titanium	None
Aluminum	5.06		
Manganese oxide	2.15	Combined carbon.....	0.14
Shot or steel.....	2.00	Manganese	1.36
Lime	None		

Specific gravity, 3.10.

This compound seemed to collect in the steel cumulatively, similar to undigested food in the human system. Its content of entrapped steel is surprising. It needed to be physicked away, but the removal of part of the manganese was believed to have prevented this.

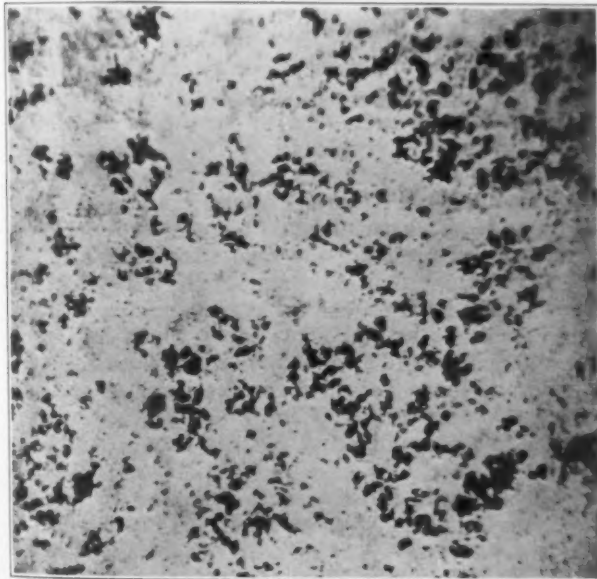


Fig. 5—Photomicrograph of a Sample from a Tooth of the Gear Etched with Picric Acid and Magnified 50 Diameters

Working on this theory, it was found that in the weeks during which this trouble had appeared the average manganese content of the steel made had been only 0.46 per cent with many heats below 0.30 per cent manganese, and even as low as 0.14 per cent manganese. Previous to this and when using normal quantities of ferromanganese the average content had been from 0.70 to 0.80 per cent manganese.

To make the investigation more thorough I selected two castings made in heats where the unusual phenomena had occurred. In addition a small test ingot was poured from two heats, exhibiting the same phenomenon. These were analyzed and then submitted to microscopic examination. The analysis of the castings and ingots were as follows:

	Ingot No. 1, Per Cent	Ingot No. 2, Per Cent	Toothed Gears, Per Cent	Small Casting, Per Cent
Manganese	0.38	0.44	0.37	0.50
Silicon	0.32	0.35	0.28	0.34
Sulphur	0.046	0.037	0.062	...
Carbon	0.15	0.17	...	0.17
Aluminum	0.01	0.01	...	0.02
Titanium	None	None	...	None

The composition of these is normal except the manganese content.



Fig. 6—Photomicrograph of the Same Steel as Fig. 5, the Gear Wheel Unetched and Magnified 180 Diameters

Samples from each of the above were submitted to microscopic examination and the results, as shown by the photomicrographs here reproduced, substantiated the theory advanced. Each one was found to be full of blowholes and oxide as revealed by the black spots appearing in the unetched specimens. The photomicrograph from the first ingot, with a manganese content of 0.38 per cent, shows the worst condition. The small casting, the one highest in manganese, was the best but it was abnormal. The gear casting revealed also an abnormal amount of manganese sulphide.

Without doubt the contributing cause of this unsound metal and of the periodical appearance of the unusual slag was the use of too little ferromanganese. The conditions governing the manufacture of steel by the side-blow converter process are of a highly oxidizing nature, and every precaution should be taken to overcome and neutralize this condition. A radical elimination of manganese, one of the strongest deoxidizing agents in use, is not a commendable procedure.

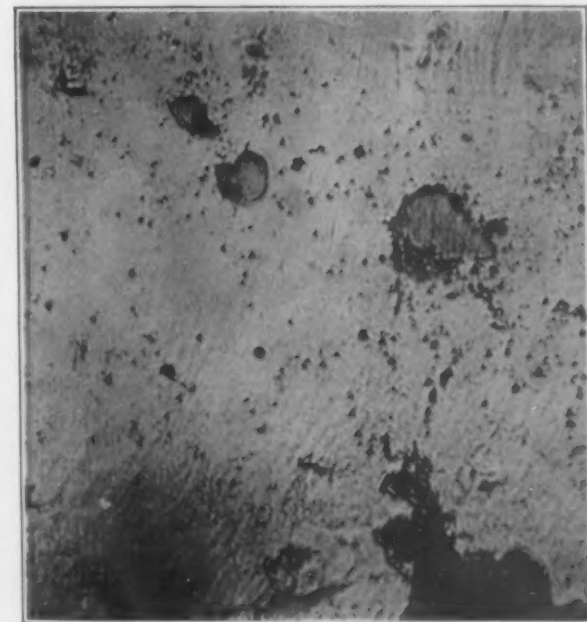


Fig. 7—Photomicrograph of the Same Steel as Figs. 6 and 7, Etched with Picric Acid and Magnified 500 Diameters, Showing Manganese Sulphides. The Black Is Pearlite

Another factor having a potent influence was that the pig iron used in the cupola had practically no manganese in it. Also it was likely that at that time this pig iron was being made under conditions which involved or favored the production of a more highly oxidized iron. If this were so, such portions of the iron might appear in the melted iron from the cupola, not necessarily continuously but intermittently.

When such iron is blown in the converter the condition of oxidation is aggravated. A considerable manganese content in the pig iron originally would have helped to neutralize this tendency, a fair initial percentage of manganese in pig iron being recognized as beneficial to steel made by any process.

It is of interest to state that as soon as the normal amount of ferromanganese was restored, all trouble was eliminated and the metal and castings were as excellent as formerly.

Horizontal Precision Tapping Machine

The H. E. Harris Engineering Company, Bridgeport, Conn., has placed on the market a precision tapping machine of the horizontal type in which a friction cone is employed for driving and reversing the tap. As is the custom in machines of this type, the reversal is accomplished at a relatively high rate of speed. The machine can also be used for work where more than one hole of the same size is to be tapped and for tapping holes in the periphery of the piece along radial lines.

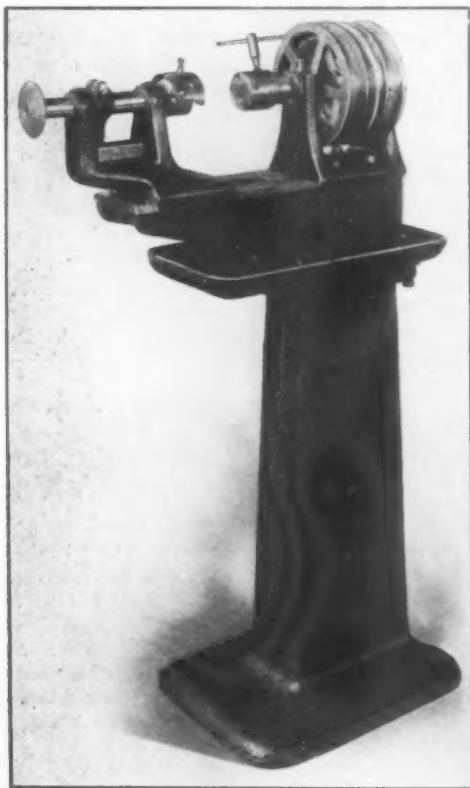
The friction employed for the drive is applied on the cone principle and consists of leather and cast-

does away with the necessity of safety chucks to guard against breakage of the tap. The forward friction is thrown into action by a slight pressure on the end of the tap, which is secured by pushing the tap into the hole drilled in the work. When the hole has been tapped to the desired depth, the work spindle in the tailstock bears against a stop, and the cone friction, it is explained, is automatically released by the action of the tap drawing into the work.

The tap is then reversed and backed out by a slight pressure of the operator's hand in a direction to pull the work from the tap. The reversal is accomplished at a speed at from 50 to 100 per cent greater than the normal operating speed, this increase being secured by a countershaft having driving pulleys of two diameters and a tight and loose pulley. The spindle, which is of small diameter, is of tool steel and the cone spider on it is made of aluminum. In this way, it is emphasized, the fly-wheel effect is kept down and the spindle comes to a stop when the friction is released, this arrangement being relied upon to insure tapping to a fixed distance or the bottom of a hole.

Work holding fixtures fitted to a taper shank are inserted in the tailstock spindle, an arrangement which is designed to insure the tapping of holes in alignment and the proper location, the taper shank being attached so as to be in line with the hole that is to be tapped. Where more than one hole is to be tapped in the work with the same size of tap, the fixture used has a circular or traverse movement or a combination of both. In this way, it is explained, by using stops all the holes can be tapped at the same setting whether they are in the same line or at the same angle. Where the holes are tapped along radial lines in the periphery of a piece, a special slide stock is substituted for the regular one and a rotating indexing mechanism is employed. When it is desired to change from one fixture to another, all that is necessary is to knock the taper shank out from the tailstock spindle, a hole that extends through the spindle being provided for the purpose, and inserting another fixture, after which the tailstock is set and the stop adjusted for the proper depth of hole.

The machine illustrated is designed to handle taps ranging from $\frac{1}{4}$ to $\frac{1}{2}$ in. in diameter and the tailstock has a range of adjustment to take care of thin work with a very short tap or larger work with a standard length $\frac{1}{2}$ -in. tap, which will tap holes about 2 in. deep. A smaller size machine of the same design is built for handling taps up to a maximum of $\frac{1}{4}$ in. This machine is of the bench type and is driven by a motor mounted underneath the bench.



A Horizontal Precision Tapping Machine in Which the Driving and Reversing of the Tap Are Accomplished by a Cone Friction

iron surfaces in contact. It is of the dry type and under normal conditions it is pointed out that no oil can work its way to the leather face and thus impair the efficiency of the drive. The leather face is cushioned and is relied upon to give an easy, sensitive and powerful grip by a slight application of longitudinal pressure. The use of the friction driving and reversing arrangement, it is emphasized,

Cast-Steel Shells from German Converters

The inclusion of numerous small Bessemer plants among the producers of cast-steel shells was referred to at the annual meeting of the German Foundrymen's Association at Düsseldorf, Germany, Aug. 5, by Dr. Werner as part of the association's work. He also mentioned an investigation of the position of aluminum in the steel industry which had been undertaken in conjunction with the Association of Iron and Steel Producers. The extent of female labor in foundries was discussed. Other topics were the progress made in the investigation of cast-iron substitutes for copper and other scarce metals, the strength of cast-iron columns and the future policy of the foundries.

The plant of the Lorain County Electric Company, Lorain, Ohio, will be greatly enlarged, and a 6250-kw. turbine driven generator will be installed. A 200-ft. stack will be erected and the boiler plant will be equipped with modern stokers.

THE 25-TON AIR FURNACE*

Advantages Over Smaller Ones in Malleable Practice—Cost Data

BY F. C. RUTZ

The malleable furnace has perhaps escaped being written about as much as any one subject pertaining to the malleable industry, and yet it is one of the most important. Improperly constructed or improperly handled furnaces are apt to wreck the best chemically calculated heat. Simple measurements of the openings between the top of either front or back bridge and the bottom of the bungs over them are apt to make either for melting with just the proper oxidizing flame, or slow melting. The latter gives the flame too much play on a slow trickling of metal causing the familiar "high heat," or too low a silicon content.

METAL SHOULD BE SNAPPY AND FLUID

A properly handled furnace will cause the metal to collapse quickly into a molten state, giving the desirable snappy life and fluidity, with a consequent decrease in defective castings.

In my opinion, after having had experience with various sizes of furnaces, the 25-ton furnace has a sufficient number of points in its favor to warrant its adoption. These points include decreased operating expense, flexibility, and space economy.

From cost figures available, the larger furnace can be operated at a total cost of \$3.25 per ton, including firemen, coal, ash, slag and repair labor, all materials, tools and equipment. This figure is an average cost for the past four years, based on average heats of slightly over 18 tons. The charges are proportioned as follows:

	Per Ton
Firemen, labor	\$0.25
All other labor .....	.40
Coal	2.00
Brick .....	.38
Fire sand and clay .....	.05
Tools and equipment .....	.16
Motor and fan repairs .....	.01
Total	\$3.25

From figures available, obtained from a number of sources, covering costs on 12 to 15 ton furnaces, the cost of melting per ton averages approximately \$3.85. Owing, however, to different methods of distributing costs, a satisfactory comparison cannot be arrived at, itemized as above. The final result, however, seems to be greatly in favor of the larger furnace.

THE MELTING RATIO

The melting ratio from a fair average covering a year's tonnage, actually poured, would be 2.75 to 1, after allowing approximately 13 per cent for shrinkage on the total amount charged, owing to oxidation, slag, etc.

As to flexibility, the advantage also appears to be greatly in favor of the larger furnace, owing to its adaptability for either large or small loads, depending upon the grade of work that one desires to make. Small heats of 12 to 15 tons can be handled as successfully as 20 to 25 tons, merely by keeping the bath of the metal at the proper depth. Another valuable feature of the larger furnace is the great space economy that can be effected, owing to its ability to do practically double the work of the 12 to 15-ton furnaces. The saving of floor space may be turned into productive channels.

DIMENSIONS OF THE FURNACE

Regarding the detailed dimension figures of a successful 25-ton furnace, the grate surface is 5 x 8 ft. The grate bars are 6 in. wide with $\frac{1}{2}$ -in. openings. The opening from the top of the front bridge to the bottom

of the center of bung is 27 in. The back bridge opening is 12½ to 13 in. The lower blast pipe is 17 in. in diameter, and the top blast 6 in. in diameter. From it 8 pipes having 2½-in. openings, pitched so as to strike at the base of the front bridge wall, extend through the wind bung. The height of the front bridge from the top of the grates is 40 to 42 in. The blast pressure is 5 ounces. The above dimensions have proved the most successful among a number of experiments made to get the most economical results.

Power and Coke-Oven Gas

Results obtained from the operation of gas engines working on coke-oven gas are described by G. Dearle in a paper published in the June issue of the *Journal of the Institution of Electrical Engineers*, Great Britain. The engines are of from 300 to 500 b.hp., direct connected to three-phase alternators, and operating at a speed of 300 r.p.m.

Several unusual features are incorporated in the design, to facilitate the operation and also to eliminate certain common causes of breakdown. The engines are of the vertical single-acting 4-stroke-cycle tandem type, with the cylinders so arranged that the explosion stroke of one cylinder on a given piston rod is the suction stroke of the other. Each crank, therefore, receives a power impulse each revolution and the inertia of the moving parts on the upward stroke is absorbed by the compression of the charge in one or the other of the cylinders. The connecting rod is thus always in compression and little or no strain is thrown on the connecting rod bolts, which are said to be the causes of more engine failures than any other part. Each engine has eight cylinders, the upper four being 16.5 in. in diameter and the lower four 1 in. less, to facilitate the withdrawal of the pistons and rods for cleaning purposes.

Gas is supplied to the engines from a battery of 60 waste-heat and 50 regenerative Otto ovens, 15 per cent of the total gas being available from the former and 40 per cent from the latter. The average gas pressure is about 10 in. The gas leaving the benzole scrubbers contains about 900 grains of H_2S per 100 cu. ft. which would combine with the condensed moisture in the gases to form sulphuric acid. This would attack the valves and cylinders and also increase the danger of preignition. The gas is therefore purified by oxide of iron in four purifiers of the Wilbourne type, each 20 ft. square and 5 ft. deep, and holding 30 tons of oxide in two tiers of ordinary grids. From 2½ to 3 per cent of air is drawn in at the exhauster, which air has an important effect in revivifying the iron oxide. The oxide is renewed every four months, while prior to the introduction of the air it was necessary to renew it every four weeks. The purifiers reduce the H_2S to less than 50 grains per cu. ft., and also remove the last traces of tar from the gas.

The usual method of mixing gas and air by diluting the mixture with a certain percentage of exhaust gas was considered inefficient and an auxiliary air supply was introduced in the mixing chamber of the engine instead. This supply is controlled by a diaphragm governor, and dilutes the gas in the mixing chamber by a certain percentage of air. A further supply of air, controlled by hand from the driving platform of the engine, is admitted to the chamber of the governor valve where the diluted gas and air meet. After passing through the chamber of the governor valve the mixture is passed through a set of vanes to give it a rotatory motion, and also through a set of perforated plates. The mixture was thus made most thorough, and overheating and preignition of the gas was eliminated. The engines were enabled to run up to and beyond their rated capacity without trouble.

By means of regular analyses of the exhaust gases and instructions to the engine drivers to drive by the pressure gage, the gas consumption was reduced from 15 million cu. ft. in March, 1914, to 12½ million cu. ft. in May of that year, the load remaining practically constant, and still further reduced somewhat later. The gas consumption is approximately 39 cu. ft. per kw. hr.

*From a paper presented Sept. 14, 1916, at the American Foundrymen's Convention in Cleveland, Ohio. The author is connected with the Rockford Malleable Iron Works, Rockford, Ill.

The Presence of Alumina in Steel*

Its Recognition and Identification — A Comparison with Other Inclusions—Failures in Service Due to Aluminum Oxide

—BY GEORGE F. COMSTOCK—

NON-METALLIC inclusions in steel have attracted remarkably little attention among students of metallography considering the vast amount of work that has been done in recent years in the investigation of metallic structures with the microscope. Indeed, the tendency is still far too common among metallographists to give the general name slag to all substances seen in polished steel surfaces that are not metal. This is especially unfortunate in regard to sulphides, which obviously are not slag, and it should be equally desirable to distinguish between other typical inclusions, such as silicates of iron or manganese, iron oxide or scale, alumina, and titanium nitride. The objects of this paper are to call attention to the fact that alumina can be distinguished from other non-metallic inclusions in steel, to indicate how it can be recog-

nized, and it was almost impossible to polish them without forming little pits around each inclusion. If the polishing is done very carefully, these pits may be kept very small; but with certain methods of polishing the pits are made so large that the original inclusions cannot be seen at all. If the specimen is not rotated continuously during the final polishing, the pits will take the form of short scratches, and each inclusion will have a little tail like a comet.

Fig. 1 shows a bar of steel in which the occurrence of alumina was assured. Although this shows a longitudinal section of a forged bar, the individual inclusions have not been elongated by the forging, but merely the groups of particles have been drawn out into streaks. Compare this with Fig. 2, showing silicates in rolled bars, and a great difference

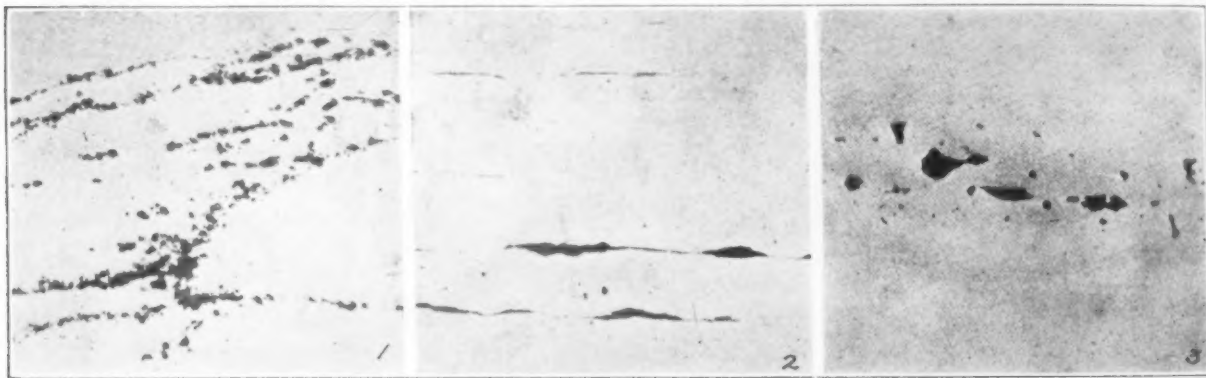


Fig. 1 is a Photomicrograph of Steel Showing Characteristic Alumina Inclusions; Fig. 2, of a Typical Silicate Inclusion in a Rolled Steel Bar; Fig. 3, of Complex Slag Inclusions in Steel

nized, and to show a few examples of the harm arising from it when locally abundant.

EXISTENCE OF ALUMINA RECOGNIZED

Various early writers on alumina in steel recognize its existence as a frequent non-metallic impurity in steel. They are aware of the potential harmfulness of this impurity, but they do not give any idea as to how it may be recognized and identified in metallographic work. To supply this deficiency was the object of the author's article on "Alumina in Steel," published in *Metallurgical and Chemical Engineering*, Dec. 1, 1915, and also printed in the Titanium Alloy Mfg. Company's booklet entitled "Ferro Carbon-Titanium in Steel Making." This article described the experiments made to ascertain the characteristic appearance of alumina in steel, and showed numerous photomicrographs to illustrate it. In the first bar of steel that came to the author's attention, in which alumina was known to be present, it was found in the form of small rounded spots, arranged close together in one elongated streak. They were of a very dark bluish-gray color, when examined with the white light of an electric arc, appearing black unless highly mag-

is evident at once, for the individual silicate particles are very much elongated in the direction of rolling. It should perhaps be noted here that there is no difference between rolling and forging in their effects on either alumina or silicates.

DIFFERENCES BETWEEN ALUMINA AND OTHER INCLUSIONS

The differences between inclusions of alumina and ordinary slag or silicates in steel are summarized as follows:

Silicate inclusions will generally take a fairly smooth polish in a section prepared for microscopic examination, while alumina is very hard to polish without pitting.

Silicate inclusions are always elongated in the direction of rolling or forging, while alumina particles are not. The groups of particles are of course elongated, but not the particles themselves.

Silicate inclusions are often found of quite large size, as well as very small, while particles of alumina are always small, and do not seem to coalesce into large bodies even when closely grouped together.

These characteristics of alumina inclusions agree with what is known of the properties of alumina. Its great hardness and brittleness would account for the pitting effect; its infusibility would account for the small size of the particles and the tendency not

*From a paper presented, Sept. 14, 1916, at the American Foundrymen's Convention in Cleveland. The author is metallurgist for the Titanium Alloy Mfg. Company, Niagara Falls, N. Y.

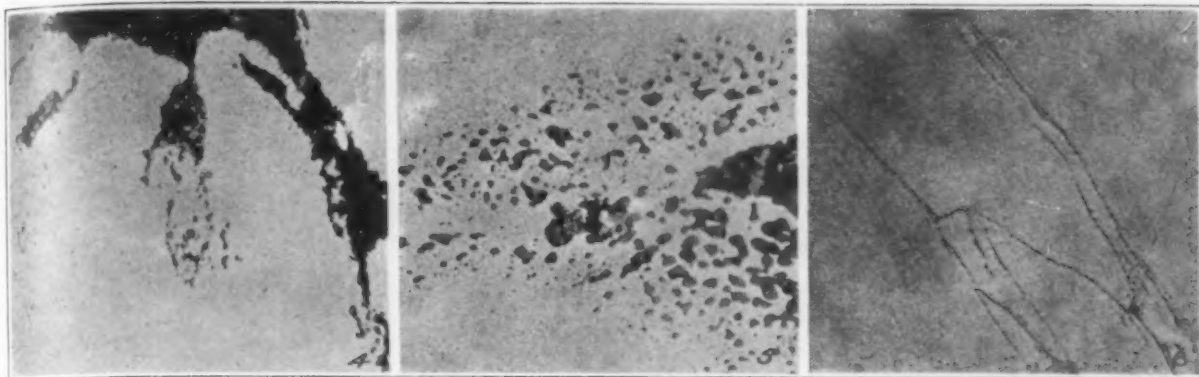


Fig. 4 is a Photomicrograph of Chromium Oxide Embedded in Steel; Fig. 5, of Inclusions in Steel Treated with Nickel Oxide; Fig. 6, of Alumina Particles in the Same Sample as Fig. 1, but Magnified Less

to coalesce; and both of these properties together would account for the particles not being elongated by forging or rolling of the steel in which they are embedded.

It was brought out in my former article that no other substance was known to me that had exactly the same appearance as alumina in a polished steel section, and this statement still holds true. Fig. 3 shows some complex slag inclusions, probably containing titanium, since the steel was treated with oxide of titanium before casting. Evidently it cannot be said that this oxide looks like alumina. Fig. 4 shows oxide of chromium embedded in steel. These resemble alumina slightly in a photograph, but when seen directly through the microscope they may be distinguished by their smooth polish and purplish color. Fig. 5 shows the inclusions in steel treated with nickel oxide. These are probably oxide of iron, and could not be mistaken for alumina. Titanium nitride crystals are easily identified by their angular form and pink or orange color, which is shared by no other substance in steel. The differences between silicates and alumina have been pointed out and sulphides are of course known to nearly all metallurgists by their smooth dove-gray appearance. Thus the appearance of alumina is believed to be distinct, and warrants the identification of this substance in steel by metallographic examination.

The author's work in establishing this identification has been based largely on checking the microscopic evidence by chemical analysis. It was stated in the previous article that all samples in which more than the merest trace of alumina was found by analysis were seen to contain the typical inclusions as described above, and those in which alumina was not found by analysis, did not contain these inclusions. Furthermore, those in which more alumina was found by analysis contained more of these inclusions than those in which only a very

little was found. These analyses were not made under the author's direction, but in a different laboratory, and neither the chemist nor the metallurgist knew each other's results until the work of both on any given sample was completed.

INVESTIGATION BY PROF. SAUVEUR

The well known metallurgist, Prof. Albert Sauveur, of Harvard University, has recently completed an independent investigation dealing with the occurrence of alumina inclusions in steel, in the course of which he examined some of the author's specimens as well as some that he himself prepared. His report of this work was published in THE IRON AGE, July 27, 1916. Fig. 6 is a photomicrograph taken by Professor Sauveur of the same sample shown in Fig. 1, but magnified only about 36 diameters. It illustrates well the "filmy" arrangement sometimes assumed by alumina particles, as mentioned by Martens and Heyn, early investigators. The conclusion reached by Professor Sauveur was that "alumina inclusions may be distinguished under the microscope from the other inclusions generally occurring in steel, being characterized by their small size, their dark coloration, and more especially by a complete absence of elongation in the direction of the rolling or forging."

IDENTIFYING ALUMINA IN CAST STEEL

To a foundryman it may appear that the characteristic appearance of alumina inclusions, as compared with slag or silicates, is only exhibited in worked steel, but this is not the case. The identification of alumina in cast steel calls for more care and experience than in worked steel, for small silicates here exist as globules instead of fibers, and might perhaps be mistaken for alumina if carelessly polished and examined. But the very dark color of alumina, its rough appearance and the pitting effect, and the invariably small size of the



Fig. 7 is a Photomicrograph of Alumina Inclusions in Soft Steel Castings; Fig. 8, of a Large Typical Slag Inclusion in Steel Castings; Fig. 9, of a Section Near the Top of an Ingot Where the Alumina Content Was Unusually High



Fig. 10 is a Photomicrograph of Alumina Particles Near the Fracture in a Locomotive Tire; Fig. 11, of Alumina and Sulphide Particles in a Failed Rail; Fig. 12, of a Section of a Blistered Thin Steel Plate

individual particles are sufficiently distinctive characteristics to enable it to be recognized in castings as well as forgings, especially if the observer is careful and already familiar with its appearance. Fig. 7 shows these inclusions in a casting of soft steel, where the presence of free alumina was established by chemical analysis of the insoluble residue from a large sample. Fig. 8 shows a fairly typical though large slag inclusion in another casting, and the sharp outlines of the slag, as compared with the rough appearance of the alumina, are clearly brought out. This slag, moreover, as is often the case, is evidently not homogeneous, but of duplex composition. Fig. 9 shows a section near the extreme top of an ingot, where the alumina content was excessively high. This foamy appearance is rare, but to a certain extent it resembles descriptions by Martens and Heyn. The usual aspect of alumina in cast steel is the same as in forged or rolled steel, with the single exception that when the particles are grouped closely together in certain spots, these groups are of irregular or rounded shape in castings, instead of being elongated into streaks as in a rolled bar.

A similar difficulty to that experienced in castings may be encountered in cold-worked steel, such as wires, tensile test bars after pulling, etc. Here the slag or silicate fibers are usually broken up into fragments and drawn out into streaks, but if carefully polished the fragments of silicates can be recognized by their definite and angular outlines and their smooth surface, while alumina particles will be rougher, probably more or less pitted, and less distinctly outlined.

It is not desired to give the impression that alumina always exists in steel in the form of such large groups of particles as shown in the photomicrographs. Its most usual mode of occurrence is probably in isolated particles, thinly scattered through the metal, and in this form it is practically harmless. The danger in its use as a deoxidizer lies in the fact that with our present knowledge, or under present mill conditions, we can never be sure that the alumina particles will not segregate or gather together in certain parts of the casting or ingot. When this happens the results are dangerously weak streaks. They may not be common, but they nevertheless do occur when aluminum is used, and may cause great harm.

SERVICE FAILURES DUE TO ALUMINA

Fig. 10 shows a group of alumina particles near the starting point of the fracture of a large driving tire on a railroad locomotive. No other defect could be found to explain the failure, except the presence of too much alumina, segregated in spots through the metal. Fig. 11 shows part of a streak of alumina

and sulphide particles that caused the top of the head of a rail to break and shell off in the track. The contrast in appearance between alumina and sulphides is well brought out in this photomicrograph. Fig. 12 shows a section of a thin steel plate, on which blisters appeared after hot-rolling. A large streak of alumina was found near the surface of the plate, and part of this streak is shown in the photomicrograph. The black strip along one edge is space beyond the edge of the section, or beyond the surface of the plate, and the other long black spots are sections of blisters, the bright areas being, as in all the other photomicrographs, the polished surface of the steel. The metal evidently tore through the alumina streak, as the blisters are seen to lie in it, and the contraction of the hot interior of the plate after rolling caused the cooler outside layer to bulge outward, forming blisters where the separation or tearing in the alumina had taken place.

All the photomicrographs here reproduced except Fig. 6, taken by Professor Sauveur, were made at a magnification of 200 diameters, and no etching reagent was used.

A New Virginia Manganese-Ore Company

The Consolidated Manganese Corporation, recently organized, has taken over a Virginia manganese-ore property, and is mining and shipping high grade ore. The mine has been known as the Piedmont or Meyers mine, located about 6 miles east of Lynchburg, Va. When formerly operated it had yielded 5052 tons from one shaft, with a total output of about 30,000 tons of washed ore. The new company has already shipped 750 to 1000 tons of ore averaging from 45 to 55 per cent manganese, 3 per cent iron, 7 to 8 per cent silica and 0.16 per cent phosphorus, which compares very favorably with the product of Brazilian or Indian mines. It is planned to increase the output to 1000 to 1500 tons per month. New York parties are back of the enterprise. Van Neas Heermance is president and H. T. Helver, general manager. Offices will soon be established in New York. C. M. Weld, 60 Broadway, New York, formerly associated with the Tata Iron & Steel Company, Sakchi, India, as a mining engineer, is consulting engineer in charge of the mines for the new company. The Matthew Addy Company is sales agent.

The Bridgeport Housing Company, Bridgeport, Conn., which has been incorporated with a capital stock of \$1,000,000, has a list of officers and a board of directors composed of some of the largest industrial and financial leaders in the city. The company purposes building at least 1000 houses now badly needed. Frederick C. Blanchard, for the past 10 years manager of the Ashcroft Mfg. Company, and previously production manager of the Fort Wayne works of the General Electric Company, has been selected as manager of the new enterprise.

NOVEL SHOP RESTAURANT

Hundreds Are Served in a Short Time by a Mechanical Device Which Dispenses with Waiters

The problem of rapidly serving several hundred employees with good meals in a company restaurant without the assistance of waiters appears to have been solved by a system recently installed by Endicott, Johnson & Co. at one of their large factories at Johnson City, N. Y., a suburb of Binghamton. In this restaurant a hot lunch—it may well be called a dinner—is sold for 15 cents. The excellence of the food might be dwelt on, but it is the equipment of the place and the mechanical arrangements for facilitating service to which particular interest attaches.

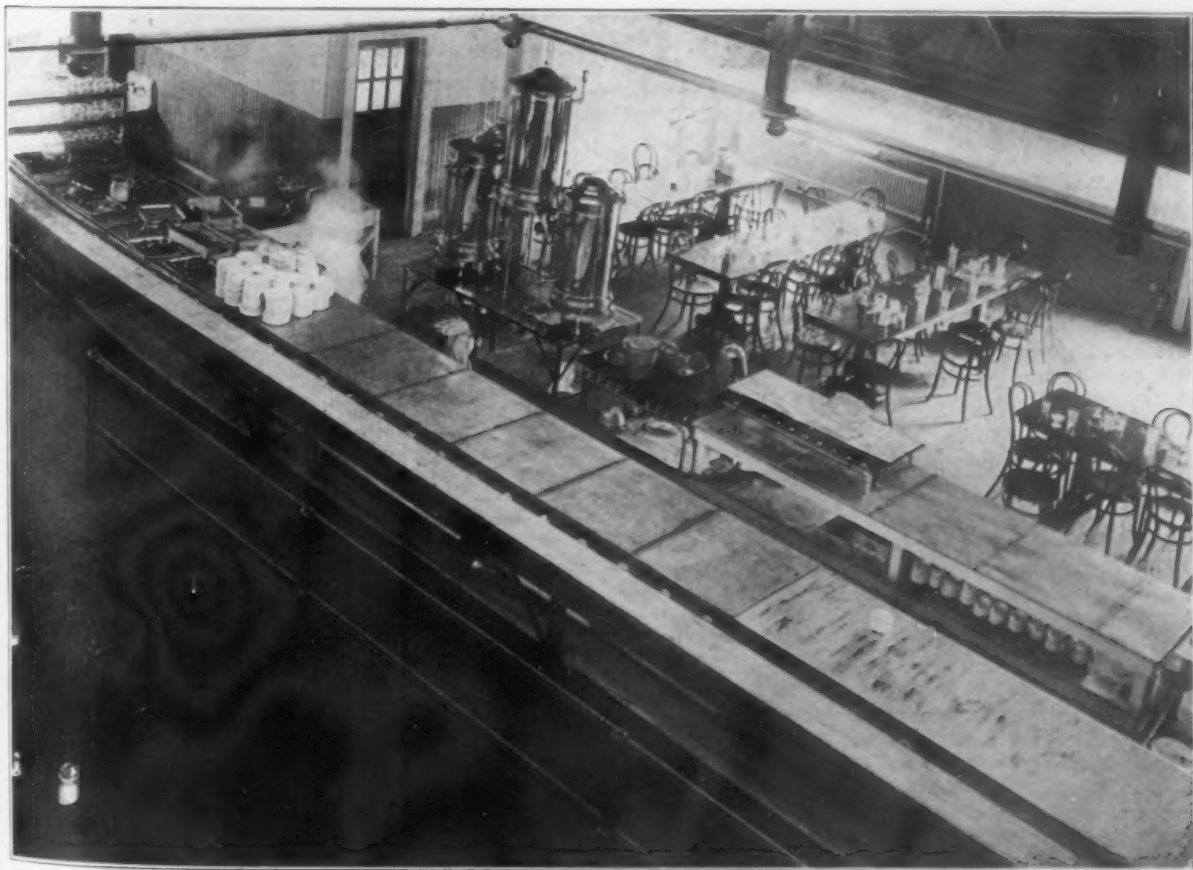
To the restaurant and its appurtenances a three-story building, 75 x 100 ft., is given up exclusively. The first floor is devoted to the storerooms, refrigerating plant, cold storage, bakery and kitchens, all supplied with modern machinery. On the second floor is the dining room with seating capacity for 600 persons at one time. The employees enter this room by passing over a bridge from the factory; then turning to the right walk in a single line between the wall and a railing constructed of pipe. At the end of the passageway, which serves to keep them in line, they purchase a ticket from a cashier who operates a ticket machine. From this point there stretches across the room for a distance of 45 ft. a cotton belt conveyor electrically driven, carried on wooden rollers spaced 12 in. apart. As each employee approaches the moving belt he picks up an aluminum tray, 12 x 19 in., on which an attendant places bread or biscuits. The employee then deposits in a box the ticket he purchased and places

his tray on the belt. From that moment he must keep moving at the same rate as the tray. Parallel with the conveyor and immediately adjoining it, opposite the line of workers, as shown, is a long table on which attendants place dishes of food as fast as others are removed. For the hot dishes there are steam tables.

As the employee walks along, he first picks up a plate containing meat and potatoes and places it on his tray, then a vegetable, then a knife, fork and spoon, pie and ice cream, mug of coffee, bottle of milk, or both, glass of water—he is not stinted in anything.

Once out of the railing inclosed gangway, the employee is free to go to whatever table he chooses where there is room, though he is requested to go to the rear of the room if possible. When a person is through eating he leaves his tray and makes his way to the exit. Boys gather up the trays with their burden of dishes and place them on wheeled trucks; these in turn are taken by elevator to the floor below for washing, which is done by machine.

Before the belt conveyor was installed trouble and delay resulted from the habit of some of the men and women in hovering over the dishes to pick out what to them looked best or largest. One or two fastidious persons would delay scores of others waiting to get their food. Again, trays were carried unevenly, inasmuch as only one hand was available for the purpose a large part of the time, and the falling of dishes and their contents was almost unavoidable. All of these troubles disappeared with the use of the belt and the consequent livelier movement of the line. The record achieved by the system is the serving of 840 employees in 45 minutes, although in the course of a day many more are fed. The company operates two restaurants and at Endicott a third is building. The two restaurants in operation prepare food for five of the six factories



One end of company restaurant of Endicott, Johnson & Co., Johnson City, N. Y., showing belt conveyor on which employees place aluminum trays, then passing in line before the long serving table, picking up their portions and placing them on the trays as they pass. When a tray is filled the employee goes to one of the tables in the same room, of which there are sufficient to seat 600 persons at a time. Several hundred are served in 45 minutes.

of the company. Of the 12,000 employees, 4000 are cared for at breakfast, dinner and supper, for the restaurant which has been described is open from 6.15 a. m. to 5.30 p. m. In its kitchens are prepared daily 2000 sandwiches which are sold to piece-workers by boys who go through the various shops. Officers and department heads share the same food and the same tables in the restaurant. On the third floor of the building is a lunch counter, soon to be extended around three sides of the room, for those who prefer that mode of service.

It is admitted by the management that the meals are sold at less than cost, but it is sufficiently satisfied with the results to go ahead with extensions of the idea. George F. Johnson and other members of the company assert their belief that their people are entitled to good hot meals, and to one who has surveyed the situation there can be no question that the net result is more contented and more efficient workers. Only praise for the company and its welfare methods is heard.

Electric fans are numerous throughout the shops, and a remark concerning them by a member of the

company illustrates its attitude. He said: "They have fans in saloons, where men don't work; why should they not be in places where men do work?" Over the fans are signs saying that they are to be touched only by the electrician or foremen.

The company maintains large and excellently equipped playgrounds for the youngsters of the neighborhood, a dozen or more tennis courts and a huge swimming pool, all of which are illuminated at night; also a public park and ball park, all carefully policed. A fire department with motor-driven apparatus is a feature. Bicycles and many other articles are sold to the employees at cost and on easy payments. Band concerts are given at three places several times a week.

The shops are non-union. George F. Johnson is known as a man of few words. It is related that a short time ago a committee of employees, inspired by outside agitators, went to Mr. Johnson and said they wanted to organize a union. He replied he had all the money he needed, and that when they organized for protection they did not need he would shut down the factory. The matter went no further.

July Iron and Steel Exports and Imports

Some Falling Off in Exports as Compared with Previous Months of Heavy Trade
—Ferromanganese Imports Now Shown

WASHINGTON, D. C., Sept. 11, 1916.—The official statistics of the exports of iron and steel from the United States in July, 1916, will suggest to many minds that the high-water mark of the big war boom has been reached and the downward movement begun. Moderate declines are noted in both values and quantities of the principal classes of products as compared with May and June. In view of the fact, however, that the month consisted of but 25 official working days, and that transportation, especially of export goods, was more or less interrupted by embargoes, formal and informal, the decreases noted are far from conclusive evidence that the export movement is on the down grade.

The total shipments of iron and steel products in July, on a basis of values, rose 100 per cent as compared with the same month of 1915, but declined 7.7 per cent as compared with the banner record of June. Tonnage commodities gained 35 per cent over July, 1915, but decreased 8 per cent as compared with May of this year. Shipments of machinery rose 68 per cent over July, 1915, but lost 4½ per cent as compared with May, 1916. Exports of machine tools gained 100 per cent over July, 1915, but lost 21 per cent as compared with the phenomenal total of May, 1916, when all records were shattered.

Figures for the seven months of 1916, as compared with the corresponding period of 1915, are especially significant, as the depressed period immediately following the outbreak of the war is eliminated from the comparison. The total shipments of iron and steel for the seven months of 1916 gained 153 per cent over 1915 and 145 per cent over the record total for the same period of 1913. Tonnage commodities gained 84 per cent over the corresponding months of 1915, which, in turn, represented a large increase over any previous comparable period. Exports of machinery recorded an 81 per cent rise over the seven months of 1915 and a gain of 60 per cent over the high record of 1913. Machine tools scored a rise of 100 per cent over the seven months of 1915, which constituted the record for this period.

The value of all shipments of iron and steel products in July, 1916, was \$70,345,162, as compared with \$35,-891,575 for the same month of 1915, and \$16,737,552

for July, 1914. The high record for exports of iron and steel was made in June of this year, when the total was \$76,257,884. For the seven months of 1916 the total was \$442,240,120, as compared with \$174,970,645 for the same period of 1915, and \$179,703,554, the record for seven months, which was made in 1913.

EXPORTS OF TONNAGE IRON AND STEEL

The exports of iron and steel for which quantities are given aggregated 496,624 gross tons in July, 1916, as compared with 368,893 tons in July, 1915. The record for these exports was made in May of this year, when the total was 540,591 gross tons. The total for the seven months of 1916 was 3,116,234 gross tons, as compared with 1,676,485 tons in 1915.

The following table shows the exports of tonnage iron and steel for July and for the seven months ended July, 1916, as compared with 1915:

	Gross Tons			
	July		Seven Months	
	1915	1916	1915	1916
Pig iron	21,589	28,718	109,040	178,118
Scrap	728	4,788	21,275	103,684
Bar iron	6,712	6,934	16,038	47,038
Wire rods	16,008	14,598	91,072	96,133
Steel bars	49,524	78,947	219,371	445,256
Billets, ingots and blooms, n.e.s.	67,121	129,278	263,985	727,644
Bolts and nuts	3,010	2,286	10,120	16,704
Hoops and bands	2,142	3,953	12,213	25,941
Horseshoes	2,462	841	10,193	5,834
Cut nails	568	630	2,265	2,517
Railroad spikes	1,090	1,495	3,642	17,195
Wire nails	10,514	12,328	45,604	84,532
All other nails including tacks	777	869	4,442	4,918
Cast-iron pipes and fittings	3,872	6,466	27,844	36,025
Wrought pipes and fittings	11,484	14,420	72,463	71,060
Radiators and cast-iron boilers	252	193	1,186	1,198
Steel rails	31,802	21,822	126,394	262,953
Galvanized iron sheets and plates	12,373	7,133	48,533	46,596
All other iron sheets and plates	3,094	2,941	9,594	26,527
Steel plates	31,871	21,778	108,300	145,812
Steel sheets	9,074	7,323	57,366	59,574
Structural iron and steel	26,151	26,583	116,348	154,569
Tin and terne plates ..	13,845	18,742	60,855	141,599
Barb wire	29,986	47,474	119,551	252,672
All other wire	22,574	36,079	121,791	162,135
Total	368,893	496,624	1,676,485	3,116,234

EXPORTS OF MACHINERY

Exports of machinery in July, 1916, were valued at \$18,971,052, as compared with \$11,412,623 for the same month of 1915, and \$8,060,614 in July, 1914. Shipments of metal-working machinery aggregated \$7,814,691 in July, as compared with \$3,872,358 for the same month a year ago, and \$9,935,806, the high record of May of the present year. Exports of machinery of all kinds for the seven months ended July, 1916, were valued at \$123,406,983, as compared with \$67,959,822 in 1915, and \$76,830,444, the record total of 1913.

Details of the exports of machinery for July, 1915 and 1916, and for the two seven-months' periods, are given in an accompanying table.

IMPORTS OF IRON AND STEEL

Imports of tonnage iron and steel in July amounted to 14,773 gross tons, as compared with 20,857 tons in 1915. Imports for the seven months of 1916 were 145,-

Exports of Railroad Material

Exports of railroad material in the fiscal year ended June 30, 1916, as compared with those for the fiscal year 1914, are given by the *Railway Age Gazette* as follows:

	Fiscal Year	
	1916	1914
Railroad cars	\$26,660,000	\$11,178,000
Rails for railroads	17,687,000	10,259,000
Locomotives, steam	12,666,000	3,692,000
Locomotives, electric	455,000	437,000
Engine parts (all kinds)	7,274,000	3,357,000
Switches and other track materials ..	5,262,000	2,534,000
Ties	2,435,000	2,565,000
Railroad spikes	1,399,000	346,000
Carwheels	742,000	414,000
Telegraph instruments	149,000	137,000
Total	\$74,729,000	\$34,919,000

Until very recently the foremost foreign markets for our freight cars have been Canada and Cuba; for locomotives, Cuba, Canada and Brazil, and for steel rails, Canada, Australia, Japan, Brazil, Argentina and Cuba. At present we are sending large quantities of

Exports of Machinery

	July		Seven Months	
	1915	1916	1915	1916
Adding machines	\$68,705	\$108,662	\$268,530	\$827,802
Air-compressing machinery	23,987	87,489	247,600	381,865
Brewers' machinery	10,464	791	52,656	11,282
Cash registers	156,254	74,559	783,396	871,821
Parts of	14,627	22,600	62,987	87,534
Cotton gins	5,592	4,606	29,490	39,344
Cream separators	31,200	26,375	156,870	320,863
Elevators and elevator machinery ..	90,608	155,527	468,132	948,364
Electric locomotives .....	.....	13,176	134,238	373,479
Gas engines, stationary	30,395	30,690	316,761	211,946
Gasoline engines	321,755	981,345	3,081,395	9,224,071
Steam engines	372,966	1,126,375	1,933,113	5,697,812
All other engines	57,330	197,511	557,791	3,109,225
Parts of	644,606	875,130	2,363,865	5,075,839
Laundry machinery, power	31,143	18,714	192,233	170,908
All other	23,433	16,591	136,486	119,651
Lawn mowers	18,180	15,705	230,699	147,307
Metal-working machinery (including metal-working tools) ..	3,872,358	7,814,691	23,962,815	47,182,401
Meters, gas and water	22,135	26,166	157,079	204,992
Milling machinery (flour and grist) ..	295,451	152,040	1,323,034	1,514,683
Mining machinery, oil well	126,567	355,190	781,849	1,122,709
All other	569,467	651,537	2,924,528	3,519,661
Paper-mill machinery	128,455	76,007	520,632	417,471
Printing presses	163,781	114,042	889,446	1,052,668
Pumps and pumping machinery	277,986	437,277	1,581,692	2,995,688
Refrigerating and ice-making machinery ..	74,795	111,445	498,736	419,762
Sewing machines	572,925	398,068	3,683,751	3,222,701
Shoe machinery	177,287	72,680	873,774	583,926
Sugar-mill machinery	245,886	448,428	1,127,006	1,954,068
Textile machinery	180,999	333,511	1,019,724	1,995,143
Typesetting machines	34,119	130,363	236,202	737,902
Typewriting machines	672,730	742,879	3,979,272	5,899,249
Windmills	129,640	78,605	490,945	678,752
Wood-working machinery, saw mill ..	20,239	30,938	212,053	244,027
All other	65,630	52,002	446,393	483,164
All other machinery, and parts of ..	1,880,928	3,189,337	12,234,649	21,558,897
Total	\$11,412,623	\$18,971,052	\$67,959,822	\$123,406,983

309 gross tons, as compared with 124,636 tons for the same period of 1915. The following table shows the imports of tonnage commodities for July, 1916, and for the seven months ended July, as compared with 1915:

Imports of Iron and Steel

	Gross Tons			
	July		Seven Months	
	1915	1916	1915	1916
Ferromanganese .....	.....	5,341	.....	40,162
Ferrosilicon	234	487	3,546	4,042
All other pig iron	11,943	606	41,025	22,975
Scrap	3,250	4,615	16,894	34,289
Bar iron	1,136	987	5,222	4,289
Structural iron and steel	108	7	1,027	1,012
Steel billets without alloys	62	145	1,035	8,031
All other steel billets ..	753	1,202	6,512	9,007
Steel rails	3,017	546	43,572	16,520
Sheets and plates	79	192	692	1,094
Tin andterne plates ..	70	150	2,139	671
Wire rods	205	495	2,972	2,666
Total	20,857	14,773	124,636	145,309

The correspondent of THE IRON AGE recently requested the Bureau of Foreign and Domestic Commerce to cause instructions to be sent to the various ports to segregate imports of ferromanganese in the customs returns. Beginning with the new fiscal year, this is being done, the imports for July appearing for the first time in the above table.

W. L. C.

Export licenses for the shipment to the United States of solvent naphtha containing less than 5 per cent toluol are announced as subject to consideration by the British War Trade Department, according to a cablegram in *Commerce Reports*.

freight cars and other material to Russia and important supplies to France and Spain as well as to the former customers. In June alone exports of freight cars were valued at \$1,613,000, of which \$1,086,000 worth went to Russia. Steel rails valued at \$1,730,000 went abroad in June, those to France alone amounting to \$1,188,000. Of the \$721,000 worth of locomotives exported, \$272,000 worth went to Spain.

Iron-Ore Imports and Exports

Iron-ore imports to the United States in June were 134,154 gross tons, bringing the total for the fiscal year ended June 30 to 1,425,717 tons. To June 30, 1915, they were 1,196,077 tons, and to June 30, 1914, they were 2,167,662 tons. The imports for the first half of this year have been at the rate of 104,334 tons per month, against 111,773 tons per month for all of 1915. The receipts of 1,425,717 tons for the last fiscal year came as follows: 94,366 tons from Spain, 223,559 tons from Sweden, 142,570 tons from Canada, 808,859 tons from Cuba, and 156,363 tons from other countries.

Exports of iron ore in June were 203,558 tons, with the total for the fiscal year ended June 30, 1916, at 924,020 tons. In 1915 the total iron-ore exports were 708,641 tons, with 551,618 tons in 1914, and 1,042,151 tons in 1913, showing the present rate to be large.

Russia's total copper output in 1915, according to the Central War Industrial Committee, was 1,587,155 poods (1 pood = 36 lb.) against 1,949,721 poods in 1914 and 2,095,289 poods in 1913. The Ural works produced 1,043,892 poods of the 1915 output.

New Developments in Foundry Equipment

Larger Use of Completely Power-Operated Molding Machines—Other Features of the Exhibition at the Cleveland Convention

The annual exhibit of foundry equipment being held in connection with the foundrymen's conventions at Cleveland this week, the first of these exhibitions to be conducted under the auspices of the American Foundrymen's Association and Institute of Metals, is the largest and in many respects the best ever held. It occupies more floor space in the Cleveland Coliseum and the temporary annex than has been taken up by any of its predecessors. All the operating exhibits of molding machines are housed in the annex. However, two or three companies decided not to have a working exhibit, in view of the fact that they could show their machines in operation in various Cleveland foundries, and these have space in the main exhibition hall. There were a good many delays in shipments, due to the congestion following the lifting of the railroad strike embargo, and great difficulty was experienced in getting the exhibits in shape for the opening on Tuesday. Many shipments were sent by express.

While some individual exhibits of molding machines and foundry supplies are not as large as usual, there are more molding-machine exhibitors than ever, and more molding machines are shown than on any like occasion heretofore. Builders of molding machines have followed the policy of limiting somewhat their individual exhibits and showing only their very best equipment.

TENDENCY AWAY FROM HAND SQUEEZERS

The molding-machine exhibit is particularly interesting because of the number of new machines and of old machines with improved features that are shown. None of the new machines shows any radical change in construction. The exhibit as a whole indicates a tendency to use power, jolt and roll-over machines in preference to hand squeezers. In these times of high wages and scarcity of labor, together with the objection of molders to doing a great deal of hand work, both the molding-machine makers and foundrymen are turning their attention to complete power-operated machines. Improvements in old machines also include leveling and locking devices and various refinements, all in the line of increasing the efficiency and rapidity of the machine and improving the quality of the work.

The machine-tool display is larger than at Atlantic City last year, but the conditions of a year ago, when machine-tool manufacturers were so crowded with work that they had no machines that could be spared for exhibition purposes, have not changed materially, and the representation in this department was, therefore, smaller than it would otherwise have been.

The showing of sand-blast equipment is highly creditable and interesting, and would have been larger had not some of the manufacturers been so crowded with work.

An important feature is the display of oxy-acetylene welding and cutting equipment. There were five of these exhibits, as compared with two at previous foundry shows.

Had the management known in advance that there would be so many exhibitors of safety devices, a separate section would have been set aside for them. For the first time there was a display by the Committee of Safety of the American Foundrymen's Association, mainly of charts loaned by the National Safety Council.

FEATURES OF NEW MACHINES

A new jolt stripping plate and squeezing machine is presented by the Osborn Mfg. Company, Cleveland. A feature is that its head runs on a sliding track, on ball-bearing wheels, permitting it to be pulled up to a squeezing position and then pushed back out of the

way so that the mold can be removed, and thus save hand work. This is designed for small work, particularly for flywheels, gear cases, and other automobile castings. Because of the tendency to use small jolt machines instead of hand types of squeezers for small work, this company has brought out a new roll-over jolt machine, which is shown among many others. This has previously been built in larger sizes. It rolls over, jolts and draws by power, and is designed for small, deep work such as pistons, crank cases and gear cases. The two new machines displayed are of the portable type, but they are also built stationary.

The E. H. Mumford Company, Elizabeth, N. J., has a group of molding machines, including a new jolt, roll over, draw machine, designed for a large range of work, with 16-in. draw, taking 37 x 48-in. flasks, ranging in depth from 8 to 26 in., and having a capacity for castings up to 3000 lb. The table is 30' x 36 in., being large for the size of the machine to insure an unusually good support for the pattern board. The machine is equipped with a Mumford standard jolt rammer, and has a number of new features, including a locking device for securing the pattern board to the roll-over arms and a new automatic air-operated leveling device. All operations are controlled from one point, making it unnecessary for the operator to move from his position. When the flask is level it is locked into position by air. This machine also has air adjustments for different centers of gravity for flasks of different weight. The company has added a jolt attachment to its 10-in. Mumford high-tension squeezer, which is shown for the first time.

A new jolt stripping machine is shown by the Arcade Mfg. Company, Freeport, Ill. The plate is stripped away from the pattern in the usual way, and there is an automatic stripping of the plate from the flask back to its former position. This company shows its line of air squeezers and power, roll-over jolt machines with new features. The air squeezers have an improvement in their valve system and in their attachments, making them easier to operate. The power roll-over jolt machine has been provided with a self-adjusting leveling device on the drawing cylinder, and this is held firmly in place by the mold when the latter rests upon it. The Arcade Company is also showing its Modern molding machine with an improved table that swings the mold around to the side of the machine instead of coming out in front; thus another mold can be made on the machine while cores are being set in the completed mold.

Henry E. Pridmore, Chicago, is showing a 30-in. power roll-over machine in which oil, contained in a reservoir surrounding the cylinder, is used as a cushion to secure a more even draw than would be possible with air alone. The speed is controlled by a 1/4-in. valve oil outlet from the cylinder on the drawing device. All of the Pridmore power roll-over machines are now being so equipped. Another new feature is that the working parts of the electric jarring equipment run in an oil bath. In this exhibit is also shown a 24-in. power roll-over machine equipped with a new air-locking device for locking the pattern plates.

The Midland Machine Company, Detroit, is showing its 6-in. jolt-ramming, roll-over, pattern-drawing molding machine in a remodeled form, having the working parts housed and with various refinements of construction. With this machine is shown a newly designed special car for lifting out the molds and drawing them to the foundry floor.

A new combination jar ram, roll-over, pattern-drawing machine is shown by the U. S. Molding Machine Company, Cleveland. It draws the pattern direct from the sand with a counterbalanced air cylinder instead

of lowering the mold, making, it is claimed, a cleaner draw. The same principle is adopted in another new machine, a jar squeezing, roll-over, pattern-drawing machine exhibited by this company, being practically the same as the one first referred to, except that it has the squeezer attachment.

The Obermayer Company, Chicago, is showing a hand-power portable stripping plate machine of simple design, the important feature of which is that the table, when at its full height, cannot be pushed down by its load, being held firmly in its position until lowered with a lever.

CLEANING AND GRINDING EQUIPMENT

The exhibit of the Sly Mfg. Company, Cleveland, is very complete. In addition to its cleaning and sand-blast mills, the company is showing a new core oven with improved features. It has drawers that run on roller bearings, with the rollers running on T irons instead of angle irons, and the trolleys also run on roller bearings. The wide drawers are arranged so that L-iron partitions can be placed in them, making double drawers for use when baking small cores. Each drawer is provided with a clock dial.

The Macleod Company, Cincinnati, shows a new sand-blast tumbling barrel with a tapered barrel designed to provide a double tumble to the castings, which are thrown backward and forward, in addition to the regular tumbling motion produced in an ordinary type of machine.

In the disk-grinding display of the Gardner Machine Company, Beloit, Wis., several machines are shown with modifications in design. The most interesting new feature is a horizontal disk grinder equipped with a quarter-ton overhanging hoist. Another feature is the dust hood which covers the entire wheel except a small space where the work is located, so that the machine can be operated with practically no dust escaping into the room. A pattern-making machine now equipped with a gear instead of a friction drive is also shown. In order to insure the arrival of its exhibits on time, the Gardner Company shipped its entire display, weighing 23,760 lb., from the factory by express.

The first exhibit of their wide-face, ring-wheel, disk-grinding machine is made by Charles H. Besly & Co., Chicago. This machine has a wide-faced ring wheel at one end of the spindle and a helmet spiral steel disk at the other end, the latter for finishing work. It is designed particularly for flat surfacing work of a heavy nature.

In the machine-tool exhibit, the Cincinnati Pulley Machine Company, Cincinnati, Ohio, is showing a line of high-speed ball-bearing drill presses, one of which is a new sensitive drilling machine of large capacity. It has a capacity for drilling holes up to 1½ in. in diameter. It is equipped with a round swinging table and flat working base, and is built with power or plain feed.

The present high cost of crucibles has caused an added interest in non-crucible melting furnaces for brass and non-ferrous metal alloys. Two furnaces of this type, one a simplex and the other a double-chamber furnace, are shown by the Monarch Engineering & Mfg. Company, Baltimore, in addition to its regular exhibit of melting furnaces and core ovens.

Two exhibits in addition to those listed in THE IRON AGE of Sept. 7 should be mentioned. The Phoenix Mfg. Company of Eau Claire, Wis., is represented by W. L. Harrison with an exhibit of turret lathe heads and other machine-tool equipments. William Demmler & Bros., Kewanee, Ill., are exhibiting a Hewlett-Demmler core machine at booth 349 in the Annex, with H. L. Demmler in charge. The machine is adapted to the making of irregular-shaped cores.

The name of the Sand Mixing Machine Company, 52 Vanderbilt Avenue, New York, which was listed in connection with the American Foundry Equipment Company, should have appeared separately in THE IRON AGE's enumeration of Sept. 7 of firms exhibiting at the convention. The Sand Mixing Machine Company has been an exhibitor at eight consecutive conventions.

The Wm. H. Nicholls Company, Brooklyn, N. Y., is showing a new combination jolt and power molding machine with automatic stripping plate and split pattern plate device. This machine was designed for molding copper bands and is also used for molding malleable and gray iron fittings and can be used for making other molds in quantities.

Another Quebec Bridge Disaster

On Monday, Sept. 11, in the presence of more than 50,000 persons, massed along both banks of the St. Lawrence River, the last span of the new Quebec Bridge, weighing more than 5000 tons, while being hoisted from pontoons to its abutments, was raised too fast by the jack at one corner, buckled in the middle, collapsed, and sank 200 ft. to the river's bottom. A multitude of small craft that held crowds of sight-seers started the work of rescuing as many as possible of the 90 workmen who had been dashed into the river when the collapse came. Of these, 11 are known to be dead, either from drowning or injury, and the bodies of more, it is feared, may be found later. A score of injured survivors are in hospitals.

The scene of the disaster is the same spot where, on Aug. 29, 1907, a bridge structure, different in form but designed to be of nearly the same magnitude, collapsed with the loss of 70 lives. The new bridge was being built by the St. Lawrence Bridge Company. The loss in material is estimated at \$600,000. The bridge was to connect Quebec with the opposite bank of the St. Lawrence River, and to carry the traffic of eight railroads, cutting off 200 miles of the rail distance from Halifax to western Canada.

The span which fell was 640 ft. long, and was to be the keystone of the whole work, which, when completed, was to have been 3239 ft. from shore to shore. It was built on pontoons, was floated to its place, and specially built 8000-ton hydraulic jacks were designed to raise the completed span to its height.

Slight Increase in Steel Corporation's Orders

The United States Steel Corporation's statement for August showed an increase of 66,765 tons in unfilled orders on its books. The total at the close of business Aug. 31 was 9,660,357 tons. This is next to the largest ever reported, the unfilled orders as of May 31, 1916, having been 9,937,798 tons. The showing a year ago, or on Aug. 31, 1915, was only 4,908,445 tons. The following table shows the unfilled tonnage for each month from January, 1913:

	1916	1915	1914	1913
January	7,922,767	4,248,571	4,613,680	7,827,368
February	8,568,966	4,345,371	5,026,440	7,656,714
March	9,331,001	4,255,749	4,653,825	7,469,956
April	9,829,551	4,162,244	4,277,068	6,978,762
May	9,937,798	4,264,598	3,998,160	6,324,322
June	9,640,458	4,678,196	4,032,857	5,807,317
July	9,593,592	4,928,540	4,158,589	5,390,356
August	9,660,357	4,908,445	4,213,331	5,223,468
September		5,317,618	2,787,667	5,003,785
October		6,165,452	3,461,097	4,513,767
November		7,189,489	3,324,592	4,396,347
December		7,806,220	3,836,643	4,282,108

Iron and Steel Institute Fall Meeting

The annual fall meeting of the Iron and Steel Institute will be held in London, England, Sept. 21 and 22, 1916. The following papers will be presented:

- "Some Properties of Ingots," by H. Brearley.
- "Influence of Heat-Treatment on the Thermo-Electric Properties and Specific Resistance of Carbon Steels," by Prof. E. D. Campbell.
- "Heat Treatment of Eutectoid Carbon Steels," by Dr. H. M. Howe and A. G. Levy.
- "Steel Ingot Defects," by J. N. Kilby.
- "Manganese Ores of the Bukowina, Austria," by Herbert K. Scott.
- "Influence of Elements on the Properties of Steel," by Dr. J. E. Stead, F.R.S.
- "Notes on (a) Nickel Steel Scale. (b) On the Reduction of Solid Nickel and Copper Oxides by Solid Iron. (c) On Effect of Blast Furnace Gases on Wrought Iron," by Dr. J. E. Stead, F.R.S.
- "Use of Meteoric Iron by Primitive Man," by G. F. Zimmerman.

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Steel Delivery Problems

Three months ago there was some disposition to question whether the year ahead would show the same strain upon the steel mills of the United States as marked the first six months of 1916. In the efforts then made to read the signs of the next 12 months, here and there evidence appeared that some buyers of steel had provided liberally against future wants. Such buyers were not receiving the maximum amounts on their 1916 contracts and at the same time they were holding off from contracting for the first half of 1917. The situation in some of its aspects was puzzling, various distributors and other buyers being keenly interested in knowing what would be done with certain contracts on which mill deliveries were far in arrears.

Reviews of the steel market have pointed out in the past six weeks that the whole attitude of consumers toward the market has changed. The continuance of heavy purchases from abroad, with deliveries running six months and nine months ahead, and the appearance of large export inquiry for steel for other than war purposes seems to have removed all question as to the full operation of the steel capacity of the country for many months to come, and has centered attention on the buying of steel at present contract prices for delivery running well into 1917.

Nothing has so impressed students of the present remarkable situation in the steel trade with the strength of the producers' position as the measures the mills have adopted to secure a proper distribution of their output. In previous booms buyers ordered heavily ahead and then reckoned that at some time, though it might be distant, the mills would reach these orders and from then on the buyers' course would be smooth. The difference now is striking. The avalanche of orders is so great that some mills long ago gave up trying to bring up arrears. It has not availed a buyer greatly to point to an order with a June or July date, 1915. Age seems to be no longer the basis of shipments.

Two reasons are given for this new policy of some of the leading mills. One is that if they attempted to follow the old order and take care of buyers in rotation they would never catch up. The other is that a good many jobbers as well as large

consumers placed at the lower prices of last year heavy orders that were in a measure speculative and looked to large profits from the advances that seemed certain to come. There was an effort at censorship by sellers. Orders coming in were checked up carefully with the amounts placed in previous years, due allowance being made for plant extensions which called for more steel. Where the tonnage offered seemed excessive, the producers took on what they considered would meet the real wants of their consumers in the period for which contracts were sought. It is now argued by those who exercised this rigid censorship of orders last year that if some particularly pushing distributors and manufacturing consumers had been given all they wanted, much of the supply to-day would be in the hands of a comparatively small number of buyers while many who had been less forward in pressing their claims would have no steel at all.

There have been recent evidences that the policy of important steel interests is to give their customers what they actually need to have. Apparently they have succeeded in this aim; at least it is many months since there have been reports of manufacturing users of steel having to close down for lack of material. Previous records of dealings between consumer and mill have determined the treatment various users have received. Those who have been opportunists and somewhat inconstant in the placing of their orders are probably having the most difficulty. To-day the argument that his plant actually needs the steel to keep going is generally more effective in the case of a regular consumer than the offer of a premium by one not so regular.

The present regime is trying to buyers who relied on the former vogue and after placing large orders with the steel mills made engagements with their own customers which curtailed deliveries of steel have seriously upset. Some of their experiences have quite effectually disposed of the belief at one time well grounded that all orders on mill books would eventually be reached and full deliveries be made in sequence. The work of order departments is not ordinarily the best appreciated service of the mills, but there are many evidences that in these trying times some of them have contributed most creditably to the solution of unprecedented problems of delivery.

New Steel Capacity

At the beginning of 1916 comment was directed in the steel trade to the large amount of open-hearth steel capacity then under construction, and its effect upon the market in the year just ahead was a subject of discussion. This rather turned on the small amount of blast-furnace capacity under construction, in comparison with steel-making capacity, and out of this came an argument for a stronger pig-iron market than had been seen in many months. That expectation was realized, though not to the extent looked for by the prophets of \$25 pig iron in 1916.

As the year advanced various portions of the open-hearth additions were started up. From time to time attention was called to the possible effect of these new operations in relieving the tensility in steel and in bringing the supply into closer relation with the demand. There has been every incentive to producers to hurry the new furnaces into commission. Prices have been highly profitable and old and new capacity has been crowded to the utmost. But the outstanding fact in nearly nine months of increase in producing capacity is that steel prices are now higher than at the beginning of the year—an unmistakable indication of the expanding demand for American steel.

It will be of interest to summarize the new open-hearth steel plant that has been actually started up since Jan. 1, with an estimate of the addition thus made to the annual capacity in terms of ingots. In the list below the principal new plants and extensions are given, no effort being made to present the facts as to new steel castings capacity.

Pittsburgh Steel Company, Monessen, Pa.—Two 60-ton furnaces, started in August, representing 30,000 tons a year. Two others now being finished, to start in October.

Carnegie Steel Company—Three 60-ton open-hearth furnaces at Ohio works, Youngstown, Ohio. Increase, 135,000 tons a year. Two 60-ton furnaces at Clairton, Pa., already started which with 1200-ton mixer completed this month, give 150,000 tons a year additional.

American Steel & Wire Company—Two new 25-ton converters just completed at Donora, Pa., to be operated in duplexing, adding 300,000 tons a year to open-hearth output.

Cambria Steel Company, Johnstown, Pa.—Two 75-ton open-hearth furnaces, ready this month. Increase, 110,000 tons a year.

Brier Hill Steel Company, Youngstown, Ohio.—Two 100-ton open-hearth furnaces. Increase, 140,000 tons a year.

Youngstown Sheet & Tube Company, Youngstown, Ohio.—Three 100-ton open-hearth furnaces. Increase, 210,000 tons a year.

Jones & Laughlin Steel Company, Pittsburgh.—At South Side works, one 30-ton open-hearth furnace. Increase, 20,000 tons a year.

Pittsburgh Seamless Tube Company, West Economy, Pa.—Two 30-ton open-hearth furnaces. Increase, 40,000 tons a year.

United Steel Company, Canton, Ohio.—Four 75-ton fixed open-hearth furnaces and one 20-ton tilting furnace. Increase, 180,000 tons a year.

Central Steel Company, Massillon, Ohio.—Four 50-ton open-hearth furnaces. Increase, 140,000 tons a year.

Corrigan, McKinney & Co., Cleveland.—New plant of eight 75-ton open-hearth furnaces. Capacity, 325,000 tons a year.

Inland Steel Company, Indiana Harbor, Ind.—Four 75-ton open-hearth furnaces. Increase, 160,000 tons a year.

Bethlehem Steel Company, South Bethlehem, Pa.—Four 75-ton open-hearth furnaces at Lehigh plant. Increase, 160,000 tons a year.

Midvale Steel & Ordnance Company, Worth Brothers plant at Coatesville, Pa.—Six 60-ton open-hearth furnaces. Increase, 210,000 tons a year.

Lackawanna Steel Company, Buffalo, N. Y.—Nos. 21 and 22 open-hearth furnaces. Increase, 90,000 tons a year.

Donner Steel Company, Buffalo, N. Y.—Plant long idle, started since Jan. 1. Capacity, 150,000 tons a year.

Wilmington Steel Company, Wilmington, Del.—Plant long idle, started since Jan. 1. Five open-hearth furnaces; capacity, 100,000 tons a year.

The total is 2,700,000 tons a year of ingots to be rolled into various forms of finished steel. Other open-hearth furnaces capable of producing about 500,000 tons of ingots a year are expected to be ready for operation before the end of the year, which would bring the additions of 1916 up to 3,200,000 tons.

Still greater is the amount of new construction under way that will not be completed until 1917 and in some cases later. A number of the companies named above are building other open-hearth furnaces. The steady procession of announcements of new plans has been astonishing. The great Steel Corporation additions of Bessemer and open-hearth plant in the Chicago district, the new Bessemer and open-hearth construction by independents in the same district, the Bethlehem Steel Company's enormous additions at three plants, the new work at Buffalo, Johnstown, Youngstown, Lorain and in the Pittsburgh district, together give a total of fully 4,000,000 tons that will follow the 3,200,000 tons of 1916, and two-thirds to three-fourths of the 4,000,000 tons is quite certain to come into operation next year. It would not be out of the way to put the additions to the country's active capacity in open-hearth steel between Jan. 1, 1916, and July 1, 1917—eighteen months—at 5,000,000 tons, or a 12½ per cent increase on the 40,000,000-ton rate of production at the beginning of this year. What is most significant is the way these additions are being absorbed without affecting prices or changing a preponderance of demand into a preponderance of supply.

British Steel Companies Prospering

The steel trade of the United States is not alone in its enjoyment of greater profits as a result of the war. Reports of British companies now coming out show that large profits are being realized on that side of the Atlantic. Guest, Keen & Nettlefolds, Ltd., and the Workington Iron & Steel Company, prominent among British manufacturers, have just issued their financial statements for the year ended June 30. The profits of both companies had declined sharply in the two previous years, but the past year wrought a remarkable recovery. The report of the first named company shows profits of £424,480, which is £40,000, or nearly \$200,000, higher than the previous year, enabling its reserve fund to be strengthened by \$500,000, while a dividend of 15 per cent is paid to the holders of the common stock. In the case of the second company, the profits were £485,419, which is £302,000, or almost \$1,500,000, higher than for the previous year and much above anything recorded since the corporation was formed in 1909 by the amalgamation of a number of iron, coal and steel companies. The Workington Company added \$1,250,000 to its reserves and paid a dividend on its common stock of 10 per cent, against dividends of 4 per cent in the previous year and 6 per cent in each of the two years prior to that.

It is evident from the showing made by these

companies—and they are probably typical of achievements of British steel companies generally—that the trade restrictions imposed by their government have not been so onerous as to offset the profits made on the greater volume of business forced on them. The steel manufacturers of Great Britain, like their brethren of the United States, have been undoubtedly benefited by the absence of German competition.

Railroad Sliding Scale Suggested

An interesting intimation is given in a circular recently issued by Clark, Childs & Co., bankers and brokers, New York. Referring to the great desirability of an amicable adjustment between railroad managers and railroad labor, the circular proceeds as follows:

Neither side desires more detailed Government control. Both unions and railroads are managed by reasonable business men. A compromise under which both sides would share in prosperity and adversity is engaging some of the greatest railroad-legal minds. The difficulty is that some roads are weak and some strong. If all had equal resources there could be a sliding scale of wages and profits. As it is, a sliding scale of wages and rates would seem to be a fair proposition.

The suggestion of a sliding scale of wages for railroad labor certainly affords food for thought. If such an adjustment of the labor controversy could be made, railroad managers would be relieved from the recurrence of a demand for higher wages whenever conditions may seem to present to the men a favorable opportunity for exerting pressure. Undoubtedly quite a problem would be encountered in seeking a satisfactory basis on which to build a sliding scale. But perhaps the complications would be no greater than are found in industrial establishments in which the sliding scale for adjusting wages has been introduced for the precise purpose which seems to make it desirable in the railroad field. The main difficulty would of course be to find a basis satisfactory to both sides. If such a basis could be agreed upon, the employees would fully and equitably share in the profits of railroad operations in such prosperous times as are now being enjoyed. They would naturally object to assisting the railroads in enduring the stress of bad times and poor returns, but the scale would have a minimum insuring fair earnings. The business world would hail with great satisfaction such a solution of the railroad wage problem.

The Cincinnati Chamber of Commerce, Cincinnati, Ohio, is conducting a wide-awake foreign trade department under the management of A. S. Wilson. In reaching out for a wider field for Cincinnati products an effort is being made to secure more trade in the Latin countries. An indication of the vigor with which this movement is being pushed is shown by the issue of a 24-page illustrated publication entitled *O Cincinnati*, which is printed exclusively in the Portuguese language for distribution in Brazil, Portugal and Portuguese possessions.

As illustrating Brazil's financial depression it is reported that the automobiles imported in 1915 numbered 214 and in 1914, 744 as against 3218 in 1913 and 3785 in 1912. Germany and France supplied the bulk before the war. American manufacturers are now making considerable sales.

CORRESPONDENCE

Early Experience with the Open Hearth

To the Editor: In your issue of Aug. 31, 1916, H. H. Campbell, in his interesting article on the "Evolution of American Open-Hearth Practice," says that the first open-hearth furnace in the United States was built at Trenton, N. J., in 1868; one was started in South Boston in 1870, and one in Nashua, N. H., 1873.

It may be of historical interest to your readers to know that at the plant of the Midvale Steel Company, then owned by the William Butcher Steel Works of Philadelphia, a Siemens furnace for melting steel in crucibles was in operation in 1870, and during that same year a Siemens open-hearth furnace was completed, the first heat in which was run in January, 1871. This furnace was first designed to hold $3\frac{1}{2}$ tons. It was afterward enlarged to hold 5, and finally 10 tons.

The experiences of those operating it resemble Mr. Campbell's description. For shop reasons, a ladle holding more than 5 tons could not be used, but an additional ladle of the same size was practicable. The stream from the spout was divided by a "breeches runner" so as to fill the two ladles in about the same time.

G. AERTSEN,

Midvale Steel Company, Assistant to Vice-President.
Philadelphia, Pa., Sept. 5, 1916.

Germany and Russian Manganese Ore

The part played by Germans before the war in the manganese-ore industry of the Caucasus is found in a statement published in the *Bulletin of the Coal and Iron Exchange at Kharkov, Russia*. German companies worked only to a limited extent the large areas of mining lands they had obtained by lease or purchase, but purchased ore from local producers at low fixed prices. Thus the number of producers was constantly diminishing, and the peasants, tempted by German advances and loans, had every inducement to sell their lands. The number of producers declined from 374 in 1906 to 164 in 1913.

The report also states that out of the 16 export firms at Tschiatura only three are Russian, and that the Gelsenkirchen Company alone held in the railroad depots at the beginning of 1914 more than 35 per cent of the manganese ore for export. This company was the principal source of ore for the Krupp Works, and from Jan. 1 to July 18, 1914, it shipped 193,000 tons as compared with 136,000 tons in the first half of 1913.

Sulphate of aluminum is urgently needed by Argentina for clarifying its water supply. It was formerly imported from Germany, but is now difficult to obtain anywhere. American firms are quoting \$120 to \$185 per ton for it, and the estimated needs for 1917 for the country are placed at 8000 tons. As the result of a protest to the government by the Argentina public health works, a plant to manufacture the compound from native kaolin has been authorized at a cost of \$188,000. It is estimated that aluminum sulphate can be manufactured under present conditions at \$26 per ton and at \$10 per ton less when sulphuric acid falls to normal.

The situation of wage earners after the war is receiving considerable attention in Great Britain. In the report for the second quarter of this year of the Shipconstructors' and Shipwrights' Association, it is stated that "the reward of labor must not be left, as at present, to the operation of supply and demand alone; a minimum wage for all workers must be arranged, and upon that all other charges in the production of anything should be based and built up, and that having been done, labor can join with employers in seeing that wages are maintained and not reduced by sweated and unfair competition from abroad."

Foundrymen's Movement on a New Basis

Opening of the Cleveland Convention—Status of the Association as Incorporated—A Notable Gathering

With an early registration indicating that former attendance records will be broken, the American Foundrymen's Association began its twenty-first annual convention at the Statler Hotel, Cleveland, Ohio, Monday afternoon, Sept. 11. The opening meeting was a joint session with the American Institute of Metals. President R. A. Bull at the outset called attention to the fact that at the last meeting in Cleveland, 10 years ago, the association's membership was less than one-third that of to-day, and that at that Cleveland meeting the foundry exhibitions were started, there being 40 exhibits at that time as compared with 150 this week.

A brief address of welcome was made by L. T. Beeman, director of public welfare, Cleveland, and the response was by Alfred E. Howell, Nashville, Tenn., one of the association's past presidents. President Bull, who is superintendent of the Commonwealth Steel Company, Granite City, Ill., next read his annual address, which was listened to with great interest.

Address of President Bull

President Bull, in the annual presidential address, told in some detail how it came about that the American Foundrymen's Association took over the management of the exhibition feature of the annual conventions. This led to incorporating the association, so that its enlarged business necessities could be transacted more efficiently and the liability of the individual members could be eliminated. Under the older arrangements the members were liable as partners, and without a limited or fixed liability. Resolutions looking to the incorporation were passed at a meeting of the executive board of the association held at Cleveland on Jan. 15, following a suggestion made by Mr. Bull in a letter to the board members on Jan. 4 that such incorporation was advisable. Describing the events following this meeting, President Bull said in part:

THE ASSOCIATION AS INCORPORATED

"Your president and secretary were respectively chosen as temporary chairman and temporary secretary. Following this organization meeting, the temporary officers investigated the rights and privileges of corporations not organized for profit, both in Illinois and Ohio, and at a subsequent meeting of the temporary organization, held in Pittsburgh, Feb. 27, the decision to incorporate in Illinois, not for profit, was reached, because of more favorable regulations in that State. It was decided to invite all members of the executive board of the association, all honorary members of the association, the manager selected for the 1916 exhibition, and the members of the committee on exhibits, to serve as incorporators. This plan could not in its entirety be carried out, as the Illinois statutes require that all incorporators shall be citizens of the United States.

"It is interesting to know that the incorporators, 27 in number, include the following gentlemen, who have in the past rendered inestimable service to our organization: Past Presidents Seaman, Jones, Walker, Brown, Wolff, McFadden, Flagg, Waterfall, Speer, Miles and Howell, and Past Secretaries Penton and Moldenke. The charter was granted to the American Foundrymen's Association, Inc., on July 3, 1916, practically six months after the organization meeting of prospective incorporators was held.

"The object of the corporation is stated in such terms as to indicate very clearly the technical and educational nature of the organization. In this a change has been made, as the phraseology of the old constitution was so broad as to indicate a possible commercial purpose.

"In conformity with the statutes, such a corporation as ours must be composed exclusively of individuals as members; therefore, firms or corporations must indicate the names of representatives who will nominally be known as holding membership individually.

DIRECTORS TO ELECT OFFICERS

"The old executive board has been elastic, including all past presidents. The corporation was required to have a fixed number of directors stipulated in the articles of incorporation. It was decided to designate that there should be sixteen directors, all to be elected annually by and from the active and honorary members. It being the procedure of corporations to have their directors elect their executive officers, provision for such action has been made. In order to secure the continued interest of former executives, whose continued assistance has been of such great value, an advisory board has been created composed of all past presidents and honorary members, excepting those who may be elected to the directorate.

"In naming the directors for the first year, as required when we filed our articles of incorporation, it was contemplated that each director should tender his resignation at this convention and that the members of the corporation at this convention should elect the persons desired to serve as directors.

"The section of the by-laws under the head of amendments is more liberal as to the rights of the board than was the case formerly. An inherent right of directors of a corporation is that of amending by-laws at any regular or properly called meeting of the board, and a by-law cannot legally be written denying this privilege. The original provision for the modification of by-laws by the members remains as before.

"Your president naturally feels a particular pleasure in relinquishing office with the organization seemingly well started on lines of greater usefulness. He takes no credit for any especial part in what has been done to make this possible, but admits the responsibility for instituting negotiations which culminated in events of great importance. He seriously felt the constant need of wise counsel, and invariably received it from the other zealous and far-sighted members of our committee of five, to whom he feels you owe a great deal. He cannot express his deep gratitude for the indefatigable co-operation of the other members of that committee, and only in lesser degree to the exhibitors who enlarged it to a committee of eight, delegated to have charge of the 1916 exhibition.

"I am impressed with the thought that this, our twenty-first birthday—as it can be truthfully regarded—marks the enterprise of youth, and that the future will quickly develop the vigor and service of maturity. Very soon, as I believe, the privilege of membership in the American Foundrymen's Association will be universally claimed by progressive foundrymen engaged not only in the manufacture of gray iron, malleable iron and steel, but of all metals, as contemplated in the by-laws."

FEDERATION OF ENGINEERING ORGANIZATIONS

Following President Bull, Jesse L. Jones, president of the American Institute of Metals, who has charge of foundry alloy work for the Westinghouse Electric & Mfg. Company, spoke briefly. He suggested that a combination of all technical societies be effected, the existing societies becoming members of a great confederation, expressing the belief that if one organization conducted all affairs of the various technical societies their business could be carried on more economically than at present. He named as societies that might be brought together in this manner in one cen-

tral organization the American Society of Mechanical Engineers, the American Society of Civil Engineers, the American Institute of Electrical Engineers, the American Institute of Mining Engineers, the American Chemical Society and the American Society for Testing Materials.

MEMBERSHIP STATIONARY

The annual report of A. O. Backert, secretary and treasurer, showed that the membership on July 31, 1916, was 974, as compared with 973 on the same date last year. While this represents a gain of one with the delinquents included, if the names of the latter were stricken from the records the loss in membership in 11 months would be 55, or 6 per cent. On July 1, 1916, the total active membership in good standing was 918, of whom 784 were active, 118 associates and 16 honorary. As a result of campaigns conducted during the year 41 new names were enrolled.

With over 5000 gray and malleable iron and steel foundries in the United States and Canada, the membership of this association, he mentioned, represents only about 20 per cent of the industry. He regarded this as a sad commentary on the interest displayed among foundrymen in the attainment of progress by organized effort. "The dues are much lower than those of other technical societies," he continued, "and, including the entertainment features at the annual meetings, the members of our association derive direct benefits representing an actual expenditure each year of from \$13 to \$15, although the dues are only \$10. It is certain that the co-operation of the members would prove helpful in increasing the enrollment, and greater efforts on their part are earnestly requested."

Continuing, Mr. Backert said in part: "The entire expense of the exhibition was defrayed without resorting to outside sources for financial assistance, and the only charges made against your association were for the expenses of the special committee of five appointed by your executive board last year to carry on negotiations with the Foundry & Machine Exhibition Company, whose corporate name subsequently was changed to the Exhibition Company. These expenses amounted to \$930.77, and were charged to the exhibition account. However, since July 1 this sum has been transferred from the exhibition to the technical fund of your association."

"The manager of exhibits, C. E. Hoyt of Chicago, has given a bond for \$5000, which amply safeguards the association. While Mr. Hoyt receives all funds from the exhibitors, gate receipts, etc., these are transmitted daily to your treasurer, who also is under bond, and who deposits such receipts to the credit of the exhibition account."

The Monday session concluded with the appointment of a committee on resolutions consisting of S. B. Chadsey, Massey-Harris Company, Toronto, Ont.; V. E. Minich, Sand Mixing Machine Company, New York, and W. B. Robinson, THE IRON AGE, Pittsburgh.

Tuesday's Proceedings

CLEVELAND, OHIO, Sept. 12, 1916.—(By Telegraph.)

—The forecast of an excellent attendance at the meetings of the American Foundrymen's Association and the American Institute of Metals which was given by the large registration of the first day was well sustained at the joint session on Tuesday morning. This was the first experience in holding a single continuous session a day rather than the morning and afternoon sessions of previous years and the success of the plan seems already assured.

THE ENGINEER IN THE FOUNDRY

The papers presented on Tuesday morning included symposiums discussing "The Results of Closer Cooperation Between the Engineer and the Foundry" and "The Influence of Gating on Castings." In introducing the former discussion, D. W. Sowers, Buffalo, laid particular stress upon the necessity of cultivating a greater field of common knowledge between the engineer and the practical foundry operator. This point was also emphasized by Dr. Richard Moldenke, who cited the fact

that in the foundries of Europe the engineer is the one who runs the foundry, and the speaker, therefore, advised technical training for young men as a preface to the work of practical foundry operation. This symposium also included an important contribution from John Howe Hall, High Bridge, N. J., on "The Relations of the Engineer in the Steel Foundry." President Bull in reviewing Mr. Hall's paper called particular attention to the use of manganese in steel castings.

To the discussion of alloys and also to the matter of standard specifications, C. E. Chase, Pittsburgh, contributed an excellent presentation in abstract of his paper covering "The Engineer's Functions in the Non-Ferrous Metal Foundry." Referring to Mr. Chase's remarks regarding the proper methods of testing castings, Dr. Moldenke pointed out that the coupon method of testing must necessarily prove unsatisfactory, since the coupon itself represents conditions different from those within the casting, while in the casting itself a range of conditions exists. It is therefore of greater promise to work from a test bar made to present most representative conditions than drawing one's conclusions from a study of the casting in relation to the test bar. In the matter of specifications for castings applying on export orders it was pointed out that there is little hope for the acceptance of American specifications by European buyers; so that the preparation of international specifications made up of contributions from various countries must sooner or later be undertaken.

IMPORTANCE OF PROPER GATING

In discussing the proper gating of patterns, R. D. Fuller, Cleveland; A. M. Fulton, Pittsburgh, and R. R. Clarke, Pittsburgh, indicated how important to the prevention of bad castings in gray iron, malleable iron, or non-ferrous metals is the correct method of gating.

The "Gating of Patterns for Steel Castings" was read by title in the absence of the author. The paper by Mr. Fulton was especially interesting in its illustration of the use of sinkheads to prevent internal shrinkage, as contrasted with the use of chills. Mr. Clarke presented some interesting examples of methods of gating for difficult castings in aluminum and bronze, illustrations of which will be found in the subsequent publication of this paper.

The reclaiming of foundry sand was again given a large measure of attention, and in addition to the existing committee which is co-operating with the Bureau of Standards in studying the rebonding of sand a new committee was ordered appointed to co-operate with the Bureau of Mines in the matter of sand reclamation. In the past year, progress has been made by the Bureau of Standards in its investigation of what constitutes a good molding sand, and the work is progressing in the direction of preparing a synthetic or artificial molding sand, of which samples were presented by Mr. Carr, of the Bureau.

Speaking of "The Significance of the Fire Waste," Franklin H. Wentworth, Boston, brought home in a forcible address the burden the tremendous annual fire loss in this country, amounting to \$230,000,000, imposes upon the individual. He made a plea for a change in our manner of thought, which now accords sympathy to the owners of structures damaged by fire, to an attitude which condemns such, as offending against the public welfare. He also asked for action by the association in promoting the use of fire-preventing construction in foundry buildings, and the matter was referred to the association's committee on safety and sanitation.

The total value of our exports of merchandise in July, as reported by the Department of Commerce, was \$445,561,910, as compared with \$268,468,702 in July of 1915. The imports totaled \$182,722,938, against \$143,244,737 in July, 1915. In 1914 the excess of imports over exports in the month of July totaled but \$5,538,344, whereas in July, 1915, the exports showed an excess of \$125,223,965, and in July of this year an excess of \$262,838,972. The excess of exports in the first seven months of 1916, 1915 and 1914 were respectively \$1,458,461,241, \$961,222,649, and \$60,388,789.

DONNER STEEL COMPANY

To Have New Blast and Open-Hearth Furnaces
and Bar and Plate Mills

Bar mills and an 84-in. plate mill are to be included in the extensions now under way at the works of the Donner Steel Company, Buffalo, N. Y. A forge and axle plant are also under construction and coke ovens are to be added as soon as the construction program will allow.

Construction work is being rapidly pushed on the additional 600-ton blast furnace and the present furnace is being changed to a 500-ton furnace. These furnaces will be equipped with the Slick patent distributing top.

There is also under construction a reinforced-concrete dock, 1200 ft. in length, with piles, the average length of which are 52 ft., driven 4 ft. centers to rock. The top of this dock will be reinforced concrete, 24 in. in thickness. The ore and limestone will be handled direct from the boats to this dock. The ore-handling equipment consists of three Brown bridges with 7½-ton buckets.

The open-hearth addition consists of seven 100-ton stationary furnaces with the present furnaces changed to make a total of ten 100-ton furnaces. These furnaces will be equipped with waste-heat boilers, Blair ports and valves; also four Bradley 12-ft. gas producers on each furnace. These producers will be supplied with coal from an overhead storage. Two 125-ton ladle cranes and one 75-ton clean-up crane are also to be installed. The 75-ton crane will be used to handle cinder pots and empty steel ladles and can be used as an emergency hot-metal crane.

The rolling mills will consist of an 18-in. Morgan continuous billet mill, in connection with present blooming mill; one 14-in. cross-country bar mill, one 10-in. continuous bar mill, one 7-in. specialty mill, one 84-in. plate mill and one 10-in. specialty mill. The mills will be motor driven. The electric power will be furnished from steam driven turbine generators, operated from blast-furnace-gas-fired and open-hearth waste-heat boilers.

Exports of Steel Rails at High Point

Steel rail exports are very large while imports are gradually diminishing. The following comparative table is from Government data, given in gross tons:

	Exports		Imports	
	Total	Per Month	Total	Per Month
First half of 1916.....	241,854	40,319	15,974	2,662
Fiscal year, 1916.....	540,919	45,076	53,944	4,495
Fiscal year, 1915.....	159,587	13,299	55,092	4,591
Fiscal year, 1914.....	338,613	28,218	15,507	1,292
Year 1915.....	391,491	32,624	78,525	6,543
Year 1914.....	174,680	14,557	22,571	1,881
Year 1913.....	480,553	40,046	10,408	867

This shows that the present export rate of 40,000 to 45,000 tons per month is the highest known, that for 1913 having been the largest heretofore.

Imports were a record in 1915 at 6543 tons per month, but have been gradually declining until for the fiscal year ended June 30, 1916, they were 4495 tons per month and for the first six months of 1916, only 2662 tons per month.

British rail exports have dwindled from 41,676 tons per month in 1913 to 4537 tons per month for the first seven months of 1916.

The water tank of the Campbell Flour Mills Company, Ltd., Toronto, Ont., takes the form of a gigantic bag of flour built entirely of steel but shaped and painted to look like a filled bag. The tank holds 40,000 gal. of water and stands 152 ft. above the foundations on a structural steel framework which brings the tank in a conspicuous position, rendering it peculiarly effective for advertising purposes. The bag itself is 37 ft. deep and 18 ft. wide and the total weight supported is over 200 tons. The tank was provided for a sprinkler system and was designed and built by the Chicago Bridge & Iron Company, Bridgeburg, Ont.

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The Hydrol Company, Niagara Falls, N. Y., which is building a factory for the treatment of oils with hydrogen and the manufacture of artificial paraffine is installing preliminary equipment also for the manufacture of dyes out of by-products of coke, to be sent to its plant from Pittsburgh. It is stated that the company will make important tests in this line under the supervision of representatives of the Government.

The Cole Motor Company, with a capital stock of \$20,000, has been incorporated by Ewart P. Schlegel, 1002 Jancey Street, Pittsburgh, and Chalmer C. Laughner, P. O. Laughner and P. Schlegel, to deal in and repair automobiles.

Proposed Specifications for Foundry Scrap*

Report of a Committee Appointed by the American Foundrymen's Association to Draw Up Foundry Scrap Specifications

Until the appearance of the chemist in the foundry industry, it was generally believed that each class of work required a special grade of pig iron, determined by fracture, and foundrymen did not believe it possible to use any appreciable quantities of scrap in their mixtures. A little return scrap was melted, usually for castings that did not require machining. The use of steel scrap was not even considered. Some superintendents went so far as to have all nails, hoop-iron, etc., removed from their kindling wood, on the ground that it would seriously injure the quality of the castings.

Today all this is changed. Mixtures containing 50 per cent scrap are the rule, rather than the exception. Under certain conditions even as high as 80 per cent scrap may be employed and steel scrap is used freely in gray-iron foundries.

PROGRESS IN SPITE OF OBSTACLES

This progress has been made in spite of the fact that foundrymen have been greatly handicapped by the want of suitable specifications governing the classification and purchase of scrap materials. Chaos rather than system has ruled and today scrap is the only material the foundryman purchases blindfolded.

It was for the purpose of remedying this condition that this committee was appointed at the Atlantic City convention last year to continue, and if possible conclude, the preliminary work of the 1914-1915 Committee on Specifications for Foundry Scrap. It is the hope of the committee that its suggested specifications are broad enough, yet sufficiently rigid, to enable each foundryman to purchase scrap suited to his peculiar needs. At the same time, an effort has been made to draw up specifications that are fair to the dealer.

The committee realized it was going to be a difficult task to draw up specifications that would meet all requirements. Therefore, a circular letter of inquiry was sent to the 850 active members of the association requesting an expression of their ideas on the subject. Only about 50 replies were received, showing clearly how little thought is given to this important subject. Among the answers, however, were a large number of suggestions of great value and the committee wishes to thank those who so kindly replied.

Many of the replies brought out differences of opinion that indicate the necessity for a large amount of educational work. For instance, one foundryman in New Jersey believes it sufficient to "purchase gray iron and steel scrap on personal inspection." On the other hand, another foundryman, in Massachusetts, prefers an elaborate series of specifications based on chemical analysis. This foundryman states, in part: "For No. 1, I would want light mill machinery scrap that would run from 2.50 to 3.25 per cent silicon, 0.90 per cent in phosphorus, 0.80 per cent manganese and 3.90 per cent in total carbon. This, with a No. 2X iron, with silicon 2.50 per cent, would make good light machine castings." He also says: "I think any foundryman can get any kind of a mixture with almost any kind of scrap and good No. 2X pig iron, if he only knows what he wants. A good many men don't know what they want to get certain results and these men have to rely on the pig-iron salesmen for their information. They, of course, tell them that they must use their irons with a good No. 1 scrap and mix 50-50."

A foundryman in Buffalo is afraid that "any additional grading would be likely to increase the cost of the material." Another, in Texas, thinks that "in a few years, when we begin to get semi-steel scrap, we will have to change our methods of mixing steel with

our scrap, which," he anticipates, "will give us some headaches."

A foundryman in western New York wrote that there are only three classifications in general use in that vicinity, namely, stove plate, railroad and agricultural scrap. A Pacific coast foundryman wrote that specifications for scrap material could not be enforced in the far west, "due to the fact that very few foundrymen make any particular classification which is descriptive of the material, and, therefore, it is not necessary for the scrap people to sort it very closely."

CLASSIFICATION BASED ON METAL SECTION

In the view of the committee, however, the keynote of the scrap classification problem was struck by a Philadelphia foundryman, who wrote, "In classifying cast-iron scrap, our thought would be to grade it with reference to the amount of silicon (and other elements) it is likely to contain." Such a result can be reached, in the opinion of the committee, only by arranging the sub-classifications according to metal section, rather than according to the weight of the piece. Foundry practice is so standardized today that castings of similar section, made for the same general purpose, have a common, definite chemical composition, within reasonable limits. Light machinery castings, for instance, with metal sections $\frac{1}{2}$ in. or less, may be assumed to contain 2.25 to 2.75 per cent silicon, 0.08 to 0.10 per cent sulphur, 0.65 to 0.75 per cent phosphorus, 0.40 to 0.70 per cent manganese, and 3.25 to 3.50 per cent total carbon. Heavier scrap, of course, contains less silicon, and analyses assumed from the metal sections will be found to be sufficiently accurate for all practical purposes in figuring mixtures.

MALLEABLE SPECIFICATIONS

The same general principles apply to malleable scrap, which accordingly has been classified on a basis of metal sections. On this point one malleable foundryman in Indiana wrote as follows: "We believe that malleable should be divided into two sub-classifications—of heavy and light material. Heavy castings would be 5 lb. or over with a section of $\frac{3}{8}$ in. or over and light castings under 5 lb. with a section under $\frac{3}{8}$ in., but all castings with a $\frac{1}{4}$ -in. section should be classified as light. We further believe that pipe fittings should be kept in a separate classification. Cupola malleable should be classified as such with the further sub-classification as above mentioned for regular or ordinary malleable scrap."

Further reference to this question is made in a letter from a New York manufacturer of harvesting machinery, who says: "We would suggest one class of light scrap which would include sections up to $\frac{1}{4}$ in. in thickness and two classes of heavy scrap, one to contain all heavy scrap over $\frac{1}{4}$ in. in thickness and less than 24 in. in any dimension, the other to contain all over $\frac{1}{4}$ in. in thickness and greater than 24 in. in any dimension. We think it useless to make a special classification for cupola malleable, as it would be quite impossible for scrap collectors to determine which is cupola malleable, and as there is so little of this material it would take them a very long time to collect any quantity of it."

STEEL SCRAP SPECIFICATIONS

Although fairly satisfactory specifications for steel scrap have been in use for a number of years, the committee found considerable difference of opinion among steel foundrymen. An Illinois foundryman believes that a classification including short steel rails, knuckles and couplers, railroad steel and structural sheets is sufficient. Other melters prefer more elabo-

*Presented to the convention of the American Foundrymen's Association, Cleveland, Sept. 12, 1916.

rate classifications. One steel foundryman in Michigan buys nothing but drop-forged crop-ends and drop-forged flashings. Converter foundrymen point out the necessity of keeping the phosphorus under 0.04 or 0.05 per cent, at the same time specifying that the pieces be of such size as to permit easy charging in the cupola.

With the foregoing facts and opinions in mind, the committee prepared the specifications for gray iron, malleable and steel scrap presented herewith. They are submitted with the recommendation that they be adopted.

G. E. Jones, chairman; V. H. Meissner, W. J. Nugent, J. G. Garrard and H. Cole Estep.

Cast-Iron Scrap

No. 1 Machinery Scrap.—This material shall consist of cast-iron scrap of first quality which possesses evidence of having been machined, such as planed or turned surfaces, bored or drilled holes, etc. It must be cupola size, no piece to weigh more than 100 lb., and must not exceed 24 in. in length or width. It shall be classified as follows:

No. 1 Heavy, pieces greater than 1 in. in section.

No. 1 Medium, pieces $\frac{1}{2}$ in. and not to exceed 1 in. in section.

No. 1 Light, pieces not to exceed $\frac{1}{2}$ in. in section.

Scrap classified as railroad cast scrap or under any other classification of these specifications, and burnt iron of every description will not be accepted under the foregoing classifications.

No. 2 Machinery Scrap.—This shall consist of cast-iron scrap of first quality which possesses evidences of having been machined, such as planed or turned surfaces, bored or drilled holes, etc. It shall be in the unbroken state. It shall be classified as follows:

No. 2 Heavy, pieces greater than 1 in. in section.

No. 2 Medium, pieces over $\frac{1}{2}$ in. in section and not to exceed 1 in.

No. 2 Light, pieces not to exceed $\frac{1}{2}$ in. in section.

Scrap classified as railroad cast scrap or under any other classification of these specifications, and burnt iron of every description will not be accepted under the foregoing classifications.

No. 3 Rough Scrap.—This shall consist of cast scrap, such as columns, pipes, plates and rough castings of a miscellaneous nature broken to cupola size, pieces not to exceed 100 lb. in weight and must not exceed 24 in. in length or width. It shall be classed as follows:

No. 3 Heavy, pieces greater than 1 in. in section.

No. 3 Medium, pieces over $\frac{1}{2}$ in. and not to exceed 1 in. in section.

No. 3 Light, pieces not to exceed $\frac{1}{2}$ in. in section.

Scrap classified as railroad cast scrap or under any other classification of these specifications, and burnt iron of every description will not be accepted under the foregoing classifications.

No. 4 Rough Scrap.—This shall consist of cast scrap, such as columns, pipes, plates and rough castings of a miscellaneous nature in the unbroken state. It shall be classified as follows:

No. 4 Heavy, pieces greater than 1 in. in section.

No. 4 Medium, pieces over $\frac{1}{2}$ in. and not to exceed 1 in. in section.

No. 4 Light, pieces not to exceed $\frac{1}{2}$ in. in section.

Scrap classified as railroad scrap or under any other classification of these specifications, and burnt iron of every description will not be accepted under the foregoing classifications.

No. 5 Machinery Scrap.—This shall consist of burnt machinery scrap of miscellaneous character, but must not include any burnt material included in any other classification of these specifications.

No. 1 Stove Plate Scrap.—This shall consist of the best class of clean stove plate. It must be free from malleable iron and steel parts, grates, burnt iron and other miscellaneous scrap usually collected with this material.

Scrap classified as railroad scrap or under any other classification of these specifications, and burnt iron of every description will not be accepted under this classification.

No. 2 Stove Plate Scrap.—This classification includes all unburnt cast-iron stove parts not included in the No. 1 stove plate classification.

Scrap classified as railroad scrap or under any other classification of these specifications, and burnt iron of every description will not be accepted under this classification.

No. 3 Stove Plate Scrap.—This shall consist of burnt stove parts of every description, but must not include any burnt material included in any other classification of these specifications.

No. 1 Agricultural Scrap.—This shall consist of cast-iron parts of agricultural machinery and shall be free from steel,

malleable, chilled iron, such as plow points, etc., and burnt iron of every description.

No. 2 Agricultural Scrap.—This shall consist of chilled iron parts of agricultural machinery and must be free from steel, malleable and burnt iron of every description.

No. 1 Railroad Scrap.—This shall consist only of chilled cast-iron carwheels conforming to the Master Car Builders' Association standards.

No. 2 Railroad Scrap.—This shall consist of miscellaneous cast-iron carwheels not included in the No. 1 classification.

No. 3 Railroad Scrap.—This shall include only plain gray-iron brake shoes, which must be free from steel backs and inserts.

No. 4 Railroad Scrap.—This shall include steel back and insert brake shoes of both driver and car types. It shall not include brake shoes of the No. 3 classification.

No. 5 Railroad Scrap.—This shall consist of railroad burnt iron of every description.

No. 6 Railroad Scrap.—This includes unburnt railroad grate bars and grate bar rests, and journal boxes with steel parts removed.

No. 1 Radiator Scrap.—This shall consist of radiator castings, broken, with all steel malleable and other parts removed. It must be free from scale and excessive rust or corrosion.

No. 2 Radiator Scrap.—This shall consist of radiator castings, not broken, with all steel, malleable and other parts removed. It must be free from scale and excessive rust or corrosion.

Malleable Cast Scrap

Only such scrap as has undergone the annealing process will be acceptable under the following classifications:

Automobile Malleable Scrap.—This shall consist of malleable cast-iron parts of automobiles and must be free from steel forgings, stampings and gray-iron parts. Railroad malleable, agricultural malleable and miscellaneous malleable, such as valves, flanges and pipe fittings, will not be accepted under this classification.

Railroad Malleable Scrap.—This shall consist of malleable iron parts of railroad cars and other equipment. It shall be classified as follows:

No. 1 Railroad Malleable, pieces not exceeding $\frac{3}{4}$ in. in section and exceeding 24 in. in length or width.

No. 2 Railroad Malleable, pieces not less than $\frac{3}{4}$ in. and not greater than $\frac{3}{4}$ in. in section; also not exceeding 24 in. in length or width.

No. 3 Railroad Malleable, pieces greater than $\frac{3}{4}$ in. in section and exceeding 24 in. in length or width.

Agricultural malleable and miscellaneous malleable, such as valves, flanges and pipe fittings, will not be accepted in this classification.

Agricultural Malleable Scrap.—This shall consist of malleable cast-iron parts of agricultural machinery. It must be free from steel and cast iron. It shall be classified as follows:

No. 1 Agricultural Malleable, pieces not exceeding $\frac{3}{4}$ in. in section and also not exceeding 24 in. in length or width.

No. 2 Agricultural Malleable, pieces not less than $\frac{3}{4}$ in. in section and not exceeding $\frac{3}{4}$ in.; also not exceeding 24 in. in length or width.

No. 3 Agricultural Malleable, pieces greater than $\frac{3}{4}$ in. in section, and exceeding 24 in. in length or width. Miscellaneous malleable such as valves, flanges and pipe fittings will not be accepted under this classification.

Miscellaneous Malleable Scrap.—This shall consist of valves, flanges and pipe fittings of every description and such malleable cast-iron scrap as fails to conform to other classifications.

Open-Hearth Steel Scrap

HEAVY OPEN-HEARTH SCRAP

No. 1 Heavy Structural Steel Scrap.—This shall consist of all structural shapes, such as channels, angles, I-beams, plates, etc., $\frac{1}{4}$ in. in section and heavier. It must be of charging box size, not to exceed 5 ft. long and 18 in. wide. No piece shall weigh less than 25 lb. It must be free from iron of every description. This material must not include pieces that are covered with excessive rust or corrosion.

No. 2 Heavy Structural Steel Scrap.—This shall consist of all structural shapes $\frac{1}{4}$ in. in section and heavier, over 5 ft. long and 18 in. wide. No piece shall exceed 600 lb. in weight. Must be free from bent, curved and twisted pieces, and iron of every description. Must not include any material that is covered with excessive rust or corrosion.

No. 3 Steel Rails.—This shall consist of standard sections, 50 lb. and over, free from frogs, switches, guard rails and crossing rails. Must be of charging box size, not over 5 ft. long and 18 in. wide. Must not include any pieces that are covered with excessive rust or corrosion.

No. 4 Steel Rails.—This shall consist of standard sections under 50 lb. and free from frogs, switches, guard rails, and

crossing rails. Must be of charging box size not over 5 ft. long and 18 in. wide. Must not include any pieces that are covered with excessive rust or corrosion.

No. 5 Steel Rails.—This shall consist of standard sections, 50 lb. and over, not cut to charging box size. Must be free from frogs, switches, guard rails and crossing rails, and must not include any pieces that are covered with excessive rust or corrosion.

No. 6 Steel Rails.—This shall consist of standard sections under 50 lb., not cut to charging box size. Must be free from frogs, switches, guard rails and crossing rails, and must not include any pieces that are covered with excessive rust or corrosion.

No. 7 Heavy Steel Scrap.—This shall consist of guard rails, switches, crossing rails, frogs, exclusive of iron plates, etc. Must be cut apart and be of charging box size, not to exceed 5 ft. long and 18 in. wide, and must not include any pieces that are covered with excessive rust or corrosion.

No. 8 Heavy Steel Scrap.—This shall consist of frogs, guard rails, switches and crossing rails, not cut apart, over 5 ft. long and 18 in. wide. Must be free from bent, curved and twisted pieces, and must not include any pieces that are covered with excessive rust or corrosion.

No. 9 Heavy Steel Scrap.—This shall consist of locomotive drivers, engine truck and coach tires, 36 in. and over inside diameter, and must be free from excessive rust or corrosion.

No. 10 Heavy Steel Scrap.—This shall consist of miscellaneous steel tires under 36 in. in diameter, and must be free from excessive rust or corrosion.

No. 11 Steel Tires.—This shall consist of steel tires as covered by classifications Nos. 9 and 10. Must be broken to charging box size, not over 5 ft. long and 18 in. wide.

No. 12 Heavy Steel Scrap.—This shall consist of mild steel castings of a miscellaneous character. No piece shall weigh more than 300 lb. or less than 25 lb. Must not contain malleable or cast iron and must be free from excessive rust or corrosion. Must not exceed charging box size, 5 ft. long and 18 in. wide.

No. 13 Heavy Steel Scrap.—This shall consist of cast steel couplers, coupler heads, knuckles and draw bars. It must be free from iron yokes, etc., and must be free from excessive rust or corrosion.

LIGHT OPEN-HEARTH SCRAP

No. 1 Light Steel Scrap.—This shall consist of steel springs, including all standard railroad coil and elliptical springs. No bar or coil springs under $\frac{3}{8}$ in. in thickness or diameter will be accepted. The spring shall be free from plates. Elliptical springs must be cut apart. Must be free from excessive rust or corrosion.

No. 2 Light Steel Scrap.—This shall consist of miscellaneous steel, such as plates, shapes, bars, structural crop ends, forging crop ends, fish plates, steel rail chairs, rail joints, etc. Must be limited to charging box size, not over 5 ft. long and under 18 in. wide. Must be under 25 lb. in weight, and must not include bundle scrap or iron of any description. Must be free from excessive rust and corrosion.

No. 3 Light Steel Scrap.—This shall consist of turnings, drillings and borings from wrought iron and mild steel. Must be clean and free from cast-iron and malleable borings, brass, high-carbon steel borings and other metals. Must be clean and free from dirt and lumps, as well as from excessive rust or corrosion.

No. 4 Light Steel Scrap.—This shall consist of turnings, drillings and borings from high-carbon steel, such as tires and other similar material. Must be clean and free from cast-iron and malleable borings, brass and other metals. Must be clean and free from dirt and lumps. Must be free from excessive rust and corrosion.

No. 5 Light Steel Scrap.—This shall consist of bundled scrap and all light steel scrap under $\frac{1}{4}$ in. in section, free from tinned and galvanized material. Must not be larger than charging box size, that is, 5 ft. long and under 18 in. wide. Must be clean and free from excessive rust or corrosion.

No. 6 Light Steel Scrap.—This shall consist of miscellaneous cast steel not covered by other classifications. No piece shall weigh more than 25 or less than 5 lb. Must be free from malleable, cast iron, etc., as well as be clean and free from excessive rust or corrosion.

CONVERTER STEEL SCRAP

No. 1 Converter Scrap.—This shall consist of mild open-hearth steel scrap, such as structural shapes, rolling-mill crop ends, forgings and forge crop ends. No piece shall weigh more than 200 lb. or less than 25 lb., and must not exceed 24 in. in length or width. Must be free from excessive rust or corrosion.

No. 2 Converter Scrap.—This shall consist of open-hearth steel scrap, such as rails and high carbon, or hard steel scrap of a miscellaneous character. No piece shall weigh less than 25 lb. or more than 200 lb., or be greater than 24 in. in

length or width. Must be free from excessive rust or corrosion.

No. 3 Converter Scrap.—This shall consist of miscellaneous mild steel castings. No piece shall weigh more than 200 lb. or less than 25 lb. Must not contain malleable or cast iron, must not exceed 24 in. in length or width, and must be free from excessive rust or corrosion.

No. 4 Converter Scrap.—This shall consist of miscellaneous mild steel castings. No piece shall weigh more than 25 lb. Must not contain malleable or cast iron, must not exceed 24 in. in length or width, and must be free from excessive rust or corrosion.

No. 5 Converter Scrap.—This shall consist of miscellaneous steel tires, broken. No piece shall exceed 24 in. in length or width. Must be free from excessive rust or corrosion.

No. 6 Converter Scrap.—This shall consist of mild open-hearth steel scrap, such as punchings, shearings, forge flashings, forge crop ends, etc. No piece shall weigh more than 25 lb. or less than 5 lb. Must be clean and free from excessive rust or corrosion.

No. 7 Converter Scrap.—This shall consist of steel springs, including all railroad coil and elliptical springs, but no coil or bar springs shall be under $\frac{3}{8}$ in. in thickness or diameter. Must be free from plates. Elliptical springs must be cut apart and must not exceed 24 in. in length, and the material must be free from excessive rust or corrosion.

CRUCIBLE STEEL SCRAP

No. 1 Crucible Scrap.—This shall consist of open-hearth steel punchings and must be free from shearings, clippings, tinned and galvanized material of every description. Must be clean and free from dirt and excessive rust or corrosion.

No. 2 Crucible Scrap.—This shall consist of mild open-hearth steel shearings, forgings, forge flashings and clippings. No piece shall exceed 5 in. wide or 8 in. long. Must be free from dirt, tinned and galvanized material of every description and free from excessive rust or corrosion.

No. 3 Crucible Scrap.—This shall consist of carbon tool steel, such as files, stub ends of carbon tools, carbon steel saw blades, wearing plates, etc. No piece shall exceed 5 in. wide or 8 in. long, and the material must be free from excessive rust or corrosion.

No. 4 Crucible Scrap.—This shall consist of steel springs of miscellaneous character, not exceeding 5 in. in diameter or width and 8 in. long. Must be free from plates and other metals and free from excessive rust or corrosion.

No. 5 Crucible Scrap.—This shall consist of steel horse shoes, horse shoe nails, steel buckles, steel snaps, steel clamps, etc., and must be free from rubber, leather or other substances. Must be clean and free from excessive rust or corrosion.

No. 6 Crucible Scrap.—This shall consist of miscellaneous small soft steel castings, not exceeding 10 lb. in weight or 5 in. wide and 8 in. long. Must be free from malleable, cast iron or other metals, and also must be free from excessive rust or corrosion.

ELECTRIC FURNACE STEEL SCRAP

No. 1 Electric Furnace Scrap.—This shall consist of mild open-hearth steel punchings, but must not include shearings, clippings or other materials. Must be free from tinned and galvanized material of every description, and must also be clean and free from dirt and excessive rust or corrosion.

No. 2 Electric Furnace Scrap.—This shall consist of mild open-hearth steel, such as plates, shapes, structural crop ends, shearings and miscellaneous materials of this character. Must be not less than $\frac{1}{4}$ in. in section. No piece shall exceed 12 in. wide and 24 in. long, or weigh less than 10 lb. or more than 200 lb. Must be free from excessive rust or corrosion. Bundle scrap and iron of every description will not be accepted.

No. 3 Electric Furnace Scrap.—This shall consist of mild open-hearth steel, such as rolling-mill crop ends, forge crop ends, and forgings. No piece shall weigh less than 10 lb. or more than 200 lb. Must be free from excessive rust or corrosion.

No. 4 Electric Furnace Scrap.—This shall consist of miscellaneous steel tires, broken. No piece shall exceed 12 in. wide or 24 in. long, and the material must be free from excessive rust or corrosion.

No. 5 Electric Furnace Scrap.—This shall consist of high carbon open-hearth steel, such as rails, and high carbon or hard steel of miscellaneous character. No piece shall weigh less than 25 lb. or more than 200 lb. or exceed 12 in. wide or 24 in. long. Must be free from excessive rust or corrosion.

No. 6 Electric Furnace Scrap.—This shall consist of mild open-hearth steel, such as plates, shapes, structural crop ends, shearings and clippings, under $\frac{1}{4}$ in. in section. No piece shall exceed 12 in. wide and 24 in. long. Bundle scrap will be excluded, and the material must be free from hoops, cotton ties, wire, etc., commonly known as busheling, together with

tinned and galvanized material of every description. Must be free from excessive rust or corrosion.

No. 7 Electric Furnace Scrap.—This shall consist of carbon tool steel of miscellaneous character, such as files, stub ends of tools, carbon tool steel rollers, wearing plates, etc. No piece shall exceed 12 in. wide or 24 in. long. Must be free from other metals and excessive rust or corrosion.

No. 8 Electric Furnace Scrap.—This shall consist of steel springs, including all standard railroad coil and elliptical springs. No bar or coil springs shall be under $\frac{3}{8}$ in. in thickness or diameter. The springs shall be free from plates and other materials. Elliptical springs must be cut apart and not exceed 24 in. in length. Must be free from excessive rust or corrosion.

No. 9 Electric Furnace Scrap.—This shall consist of coil and leaf or elliptical springs under $\frac{3}{8}$ in. in thickness or diameter. The springs shall be free from plates and other material. Leaf or elliptical springs must be cut apart and not exceed 24 in. in length. Must be free from excessive rust or corrosion.

No. 10 Electric Furnace Scrap.—This shall consist of heavy turnings from high carbon or hard steel. Open-hearth steel must be free from light and curly turnings. Must be clean and free from excessive rust or corrosion.

No. 11 Electric Furnace Scrap.—This shall consist of heavy turnings from mild or soft open-hearth steel, free from light and curly turnings. Must be free from excessive rust or corrosion.

Note.—Material coming under all of the foregoing classifications for electric furnace steel scrap, when purchased for the acid process, is limited to 0.04 per cent phosphorus and sulphur.

Weights

Net Tons.—All scrap bought or sold under these specifications shall be handled only on a net ton basis, said ton to consist of 2000 lb.

Variations.—Variations in weights shall be subject to the regulations of the authorized weighing association operating in the territory to which the material is delivered.

Rejections.—The purchaser reserves the right to reject any material failing to conform to these specifications. In the event of a rejection, all demurrage charges and return freight shall be paid by the seller.

Pittsburgh Crucible Steel Company Extensions

The Pittsburgh Crucible Steel Company, an interest of the Crucible Steel Company of America, Pittsburgh, has decided to add two 75-ton open-hearth furnaces to its plant at Midland, Pa. These will give the company a total of twelve 75-ton furnaces, and will increase its capacity in the manufacture of high-grade steel about 8000 tons per month, making its total capacity between 40,000 and 45,000 tons per month. The main building will be extended to take care of the new furnaces. There are seven 4-hole pit furnaces, which are ample to take care of the output of the new steel capacity. The steel for the extensions, about 1750 tons, has been placed with the American Bridge Company at Pittsburgh. The Pittsburgh Crucible Steel Company is also considering the building of a heat treating and cold-drawing plant, but a definite decision has not yet been reached. The company is operating its steel works and finishing mills to utmost capacity.

Hewitt Steel Corporation Improvements

The Hewitt Steel Corporation, 111 Broadway, New York, has completely rehabilitated the plant which originally was operated by the Atha Steel Casting Company, at the foot of Chapel Street, Newark, N. J. There are three 30-ton basic open-hearth furnaces. Four new foundry bays have been added, each over 400 ft. long, with traveling cranes of 30 to 50 tons capacity. The boiler capacity has been increased to more than 1000 hp. Most of the open-hearth equipment is new. The plans of the company look to the manufacture of railroad supplies, side frames, bolsters, tender tracks, car couplers, etc., but thus far the plant has been run principally on high carbon billets, and probably will be so engaged until railroad business improves. Herbert H. Hewitt, president of the Magnus Metal Company, is the president of the new company, and R. E. Jennings, 2d, is general manager of the plant.

Pittsburgh and Nearby Districts

In August the Valley Mold & Foundry Company, Sharpsville, Pa., made and shipped from its own plant 23,458 tons of ingot molds, and also bought and shipped to its customers from other plants 1575 tons, making its total shipments 25,033 tons, an average of nearly 1000 tons for every working day, beating its previous record for any one month. The company is taking an average of about 900 tons of molten Bessemer iron per day from the adjacent Shenango Furnace Company. It sells the entire output of basic pig iron from its Alice blast furnace at Sharpsville to the same company.

Samuel Gilmore, E. L. Morris and M. R. Watts, representing the United Coal Company of Pittsburgh, have purchased 2500 acres of coal, 70 houses and mine plants of the Arrow Coal Mining Company and the Reitz Coal Company, in Somerset County, Pa. The price said to have been paid for the coal and developments was \$475,000.

Reports that the Crucible Steel Company of America, Pittsburgh, had taken an order from the British government for 35,000 9-in. shells, at a cost of nearly \$5,000,000, are officially denied. The company has taken a new British order for howitzer shells, but the number and the amount involved are less than half as stated in the first report.

The Pittsburgh Foreign Trade Commission reports the receipt of an inquiry from the American Trading Company, New York City, for 20 miles of 4-in., 20 miles of 6-in., and 36 miles of 5-in. steel pipe. The commission also reports an inquiry from the Russian Government for 15,000 tons of steel rails, for which it is willing to pay \$45 per ton.

The Kelly Mfg. Company, Bucyrus, Ohio, is building an addition to its plant, and will soon be in the market for a double-end punch and shear, with 30-in. throat, provided with structural jaws for punching angles; a $\frac{3}{4}$ -in. riveter, and a radial drill with attachments for holes up to 2 in. in diameter.

About a year ago the McKeesport Tin Plate Company, McKeesport, Pa., then operating 22 hot mills, placed contracts for the building of 20 more hot mills, but as the work progressed the company found it had room for two more. The order was then increased to 22 mills, all of which are nearly finished. The company is now operating 35 hot mills, 8 more will be ready to start in a week or so, and the other new mill will be ready about Nov. 1. The plant also contains 42 cold trains. The starting of the entire 22 new hot mills will give the company an annual capacity of 4,000,000 to 4,500,000 boxes of bright plate per year, noterne plate being made. It now has the distinction of having the largest individual tin-plate plant in the world. All the hot and cold mills and much of the other equipment were built by the United Engineering & Foundry Company, Pittsburgh.

P. Pettler & Sons, Beaver Falls, Pa., recently suffered a loss by fire estimated at \$40,000. The destroyed buildings include a two-story structure, 75 x 110 ft., fully equipped. The plant has several other buildings which were undamaged, and business is proceeding as usual.

The first report of the receivers of the Tower Hill-Connellsville Coke Company was filed last week. It shows that from Jan. 21, 1915, the date on which the receivers assumed charge, to July 1, 1916, the gross profits from the sale of coke and coal from the two plants of the company amounted to \$272,601.28. The total cash received amounted to \$1,019,532.12, and the total disbursements to \$881,769.82, leaving a balance of \$137,762.30 on hand. The accounts yet receivable will exceed the amounts payable by approximately \$30,000. The total amount of coke produced from Jan. 21, 1915, to June 30, 1916, was 493,243 tons.

Joseph E. Thropp's Saxton furnace, Saxton, Pa., blew in Aug. 24, and is running on foundry iron. Before going in blast the furnace was equipped with the C. W. Hunt filling system and a new cinder derrick.

Iron and Steel Markets

NEW CAPACITY ABSORBED

Large Increase in Steel Still Inadequate

Pig-Iron Activity Shifts—Advance in Wrought Pipe—Ore Buying for 1917

Producers and consumers of steel are so beset with delivery problems that for the time new transactions are taking a secondary place. The operation of mills is more satisfactory under September conditions and some headway against accumulated orders should be made in the next six weeks.

The outstanding fact in the present congestion is the small impression made upon it by the year's additions to steel-making capacity. A canvass shows that about 2,700,000 tons of ingots a year is represented in new open-hearth furnaces started up since Jan. 1 and about 500,000 tons more will be in operation before the close of the year. This is an 8 per cent increase on the 40,000,000-ton rate of steel production at the beginning of 1916, or less than the normal gain. There is little promise of any pronounced change in the relation of supply and demand from new capacity before the middle of next year, if then.

New contracting for steel to be delivered in the first half of 1917 is not noteworthy, yet a good many consumers have not covered for that period. In the case of plates a good deal of business for the third quarter of next year is already booked, and plate inquiry is unending. Just now 75,000 tons is before Eastern mills, in the effort of individual users to preempt a place on the books in view of the heavy demands the Government will make with its navy program. A Maine shipyard is in the market for 10,000 tons and Japan, with all her buying of ship steel, still wants 6100 tons.

In the export market the shipping of greatly needed material is getting precedence over new buying. But Russia has just bought 13,000 tons more of barb wire for shipment this year and on 7500 of the Russian cars that have been under inquiry for months there is some better chance of early action.

In rolled steel, prices hold all the strength that has developed from the situation as to semi-finished material. While plates for forward delivery can be had at 3c., from 4c. to 4.5c. is done on prompt material; but universal plates for early delivery are available at \$5 to \$10 a ton less than sheared plates. In hard bars some competition is seen, sales being made as low as 2.40c., delivered at Cleveland.

Another advance has come in wrought pipe—\$2 a ton on black butt weld, \$4 on black lap weld and \$4 on steel and iron boiler tubes, effective Sept. 7. Oil country material was advanced similarly. Galvanized pipe is not changed.

Much interest attaches to the basis for sheet bar contracts covering the last quarter of the year. For the third quarter \$37 to \$40 was paid, but it

is probable an advance of at least \$3 a ton will be made. Very little steel in the form of billets or sheet bars is to be had for early delivery at less than \$45.

Pig-iron buying, which was less vigorous in some districts last week, has developed more activity in others, particularly at Pittsburgh and Chicago. The strengthening in Southern iron is more pronounced and in the Middle West this has caused a stronger market for Northern irons. With the exception of Chicago, where Southern and Northern makers have been competing sharply, Alabama iron has come up to a \$14.50 basis. Aggressive selling at Chicago brought local iron to \$18 for No. 2. In northern Ohio, however, No. 2 iron has advanced to \$18.50 at Valley furnace.

At Pittsburgh a large foundry interest bought 25,000 tons, of which two-thirds went to the South. On deliveries in the next six months Southern iron in this case was sold as high as \$14.50 and Northern up to \$18.50 at furnace.

Basic pig iron is at last making some response to the conditions in steel. While a 20,000-ton sale was made at Youngstown last week at the long-standing \$18 price, a 10,000-ton transaction is reported at \$18.50, and producers are disposed to hold for this price. An eastern Pennsylvania steel company bought 18,000 tons of basic and 6000 tons was taken in New England. An Iowa steel company has closed for 12,000 tons.

In the Lake Superior ore market at Cleveland an Eastern interest has inquired for a large tonnage of non-Bessemer ore for 1917 delivery, and the sale will probably be made, with the price to be fixed later. Additional reservations of Bessemer and non-Bessemer ores are being made for next year, induced by the expectation that supply and demand will run a very close race in 1917 as in 1916.

Chicago

CHICAGO, ILL., Sept. 12, 1916.

Sales of pig iron in the last week have aggregated a very large tonnage. They included a lot of over 10,000 tons of basic, another of foundry iron of more than 5000 tons, Bessemer iron for export and some sizable lots of charcoal iron. Many important inquiries, one for 5000 tons of foundry iron, are still in the market. Prices of competitive iron have continued to reflect an aggressive desire on the part of producers to sell, particularly furnaces making high phosphorus Northern iron. Market activity in finished steel lines has been without new features of significance. About 10,000 tons of rails are under consideration and several lots of tie-plates. Among new inquiry for cars, that of the Nickel Plate for 500 automobile cars is the most important of domestic prospects, but the Russian Government is figuring on 7500 cars in addition to its recent purchase. Inquiry for steel for export is still being received in amounts from a few hundred tons upward and includes sheets, shipbuilding steel and bars. Local mills are in receipt of an offer of 5000 tons of sheet bars at \$45 per ton, the inquiry carrying with it evidence of difficulty in placing it in more logical markets. In anticipation of generally higher prices for

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

Pig Iron, Per Gross Ton:	Sept. 13, 1916.	Sept. 6, 1916.	Aug. 16, 1916.	Sept. 15, 1915.
No. 2 X, Philadelphia...	\$19.50	\$19.50	\$19.50	\$16.00
No. 2, Valley furnace...	18.50	18.25	18.25	14.50
No. 2 Southern, Cin'ti...	17.40	16.90	16.40	14.15
No. 2, Birmingham, Ala.	14.50	14.00	13.50	11.25
No. 2, furnace, Chicago*	<i>18.00</i>	18.50	18.50	14.00
Basic, del'd, eastern Pa.	19.75	19.75	19.00	17.00
Basic, Valley furnace...	18.00	18.00	18.00	14.75
Bessemer, Pittsburgh...	21.95	21.95	21.95	16.95
Malleable Bess., Ch'go*	19.00	19.00	19.00	14.50
Gray forge, Pittsburgh...	18.70	18.70	18.70	14.70
L. S. charcoal, Chicago...	19.75	19.75	19.75	15.75

Billets, etc., Per Gross Ton:

Bess. billets, Pittsburgh...	45.00	45.00	45.00	24.00
O.-h. billets, Pittsburgh...	45.00	45.00	45.00	24.50
O.-h. sheet bars, P'gh...	45.00	45.00	47.00	25.50
Forging billets, base, P'gh	69.00	69.00	69.00	32.00
O.-h. billets, Phila.....	48.00	48.00	45.00	30.00
Wire rods, Pittsburgh...	55.00	55.00	55.00	30.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Bess. rails, heavy at mill.	1.47 ³ / ₄	1.47 ³ / ₄	1.47 ³ / ₄	1.25
O.-h. rails, heavy at mill	1.56 ³ / ₄	1.56 ³ / ₄	1.56 ³ / ₄	1.34
Iron bars, Philadelphia...	2.65 ⁹ / ₁₆	2.65 ⁹ / ₁₆	2.65 ⁹ / ₁₆	1.45 ⁹ / ₁₆
Iron bars, Pittsburgh...	2.60	2.60	2.60	1.35
Iron bars, Chicago.....	2.35	2.35	2.35	1.25
Steel bars, Pittsburgh...	2.60	2.60	2.60	1.35
Steel bars, New York....	2.76 ⁹ / ₁₆	2.76 ⁹ / ₁₆	2.76 ⁹ / ₁₆	1.51 ⁹ / ₁₆
Tank plates, Pittsburgh...	4.00	4.00	3.50	1.35
Tank plates, New York...	4.16 ⁹ / ₁₆	4.16 ⁹ / ₁₆	3.66 ⁹ / ₁₆	1.51 ⁹ / ₁₆
Beams, etc., Pittsburgh...	2.60	2.60	2.50	1.35
Beams, etc., New York...	2.76 ⁹ / ₁₆	2.76 ⁹ / ₁₆	2.66 ⁹ / ₁₆	1.51 ⁹ / ₁₆
Skelp, grooved steel, P'gh	2.35	2.35	2.35	1.30
Skelp, sheared steel, P'gh	2.45	2.45	2.45	1.35
Steel hoops, Pittsburgh...	3.00	3.00	3.00	1.35

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire,	Sept. 13, 1916.	Sept. 6, 1916.	Aug. 16, 1916.	Sept. 15, 1915.
Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, P'gh	2.90	2.90	2.90	1.90
Galv. sheets, No. 28, P'gh	4.15	4.15	4.25	3.60
Wire nails, Pittsburgh...	2.60	2.60	2.60	1.65
Cut nails, Pittsburgh...	2.60	2.60	2.60	1.60
Fence wire, base, P'gh...	2.55	2.55	2.55	1.50
Barb wire, galv., P'gh...	3.45	3.45	3.45	2.50

Old Material, Per Gross Ton:

Iron rails, Chicago.....	18.75	18.75	18.50	13.50
Iron rails, Philadelphia...	20.00	20.00	20.00	18.50
Carwheels, Chicago.....	11.75	11.50	11.50	11.75
Carwheels, Philadelphia...	15.50	15.50	15.50	14.00
Heavy steel scrap, P'gh...	16.00	16.00	16.00	14.50
Heavy steel scrap, Phila...	14.75	14.75	14.75	15.00
Heavy steel scrap, Ch'go...	16.00	15.75	15.25	11.75
No. 1 cast, Pittsburgh...	14.50	14.50	15.00	13.00
No. 1 cast, Philadelphia...	16.00	16.00	16.00	14.00
No. 1 cast, Ch'go (net ton)	12.00	12.00	11.50	10.00
No. 1 RR. wrot, Phila...	20.00	20.00	20.00	16.50
No. 1 RR. wrot, Ch'go (net ton)	16.50	16.00	15.25	11.00

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	\$2.90	\$3.00	\$2.75	\$1.60
Furnace coke, future...	2.50	2.50	2.50	2.00
Foundry coke, prompt...	3.25	3.50	3.25	2.15
Foundry coke, future...	3.50	3.50	3.50	2.40

Metals,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	28.00	28.00	26.75	18.00
Electrolytic copper, N. Y.	28.12 ¹/₂	28.00	26.50	17.75
Spelter, St. Louis.....	9.00	8.50	8.75	13.75
Spelter, New York.....	9.25	8.75	9.00	14.00
Lead, St. Louis.....	6.60	6.60	5.90	4.35
Lead, New York.....	6.75	6.75	6.00	4.50
Tin, New York.....	38.25	38.87 ¹ / ₂	39.00	33.37 ¹ / ₂
Antimony, Asiatic, N. Y.	11.00	12.00	10.00	27.50
Tin plate, 100-lb. box, P'gh.	\$5.75	\$5.75	\$6.00	\$3.15

sheet bars in the last quarter, the market is firmer with respect to sheet prices. A substantial advance has been made in the asking prices for scrap but the higher level can not be considered as entirely established in the absence of consumer buying of any importance.

Rails and Track Supplies.—A few small lots of rails, totaling about 10,000 tons, are under consideration, in which connection the inability of the mills to deliver this year is resulting in the postponement of railroad work planned for this fall. Prices are also being asked on several lots of tie-plates, for which the makers of iron plates are the more likely bidders. Quotations are as follows: Standard railroad spikes, 2.75c., base; track bolts with square nuts, 3.25c. to 3.50c., base, all in carload lots, Chicago; tie-plates, \$50, f.o.b. mill, net ton; standard section, Bessemer rails, Chicago, \$33, base; open-hearth, \$35; light rails, 25 to 45 lb., \$40; 16 to 20 lb., \$41; 12 lb., \$42; 8 lb., \$43; angle bars, 2c., Chicago.

Pig Iron.—The week's buying movement in pig iron has involved a number of orders of large size and a general participation by gray-iron foundries throughout the district. It is stated that the Iowa inquiry for 12,000 tons of basic has been closed, as have several lots of malleable iron. There is also important inquiry for charcoal iron, including one lot of 1500 tons for a southern Illinois consumer. The feature of the market has been the competition between Southern and Northern iron having a phosphorus content of 0.50 to 0.80. In several instances Northern iron of this grade has been sold in competition with a price of \$14, Birmingham, for Southern. A large implement interest is understood to have secured a part of its total purchase at slightly under that figure. The keenness of competition is indicated by the fact that whereas furnace quotations from the South of less than \$14.50, Birmingham, were not admitted a week ago, \$18 delivered, Chicago, was done last week and is still available. Among the inquiries still outstanding are one for 5000 tons of foundry iron and several others of over 1000 tons. While the bulk of the iron being bought is for first half delivery, a surprisingly large proportion

is for last quarter shipment. Further sales of Bessemer iron for export are reported. For Lake Superior charcoal iron we quote delivery prices at Chicago to include a freight rate of \$1.75. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic iron, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5.....	\$19.75
Lake Superior charcoal, No. 1.....	20.25
Lake Superior charcoal, No. 6 and Scotch....	20.75
Northern coke foundry, No. 1.....	\$19.00 to 19.50
Northern coke foundry, No. 2.....	18.00 to 19.00
Northern coke foundry, No. 3.....	18.00 to 18.50
Southern coke, No. 1 f'dry and 1 soft 18.50 to	19.00
Southern coke, No. 2 f'dry and 2 soft 18.00 to	18.50
Malleable Bessemer	19.00
Basic	19.00
Low phosphorus	34.00
Silvery, 8 per cent.....	29.50
Bessemer ferrosilicon, 10 per cent.....	32.50

Structural Material.—Figures are being taken on the equipment for an additional 7500 cars for the Russian Government, the early placing of which is expected. New inquiry for cars from domestic roads is of a miscellaneous nature, save for 500 automobile cars to be bought by the Nickel Plate. Among the orders for fabricated steel the largest is that for 2200 tons for a steel wheel plant at the Gary works of the Illinois Steel Company. Some six additional contracts calling for an aggregate of about 1200 tons are also reported. Nearly all of the fabricators are comfortably fixed in the matter of work in their shops, and have bought as liberally as possible of plain material for first-half delivery. The report of a price of 2.70c., Pittsburgh, for structural shapes, having considerable currency in this market, has little support in the quotations of the principal mills. We quote for Chicago delivery of structural steel from mill, 2.789c.

We quote for Chicago delivery of structural steel from jobbers' stocks, 3.10c.

Plates.—There is little change in the plate situation, prices ranging downward from 4c., Pittsburgh, which is being obtained for wide plates for prompt delivery, to 3c., the generally quoted price for first half contracts. Sales of plates in average widths for early delivery are

being made at prices from 3.25c. to 3.50c. We quote for Chicago delivery of plates from mill at its convenience 3.189c. For prompt shipment we quote 3.439c. to 3.689c. in widths up to 72 in., and for wide plates 4.189c.

We quote for Chicago delivery of plates from jobbers' stocks, 3.50c.

Sheets.—While the strengthening of the market with respect to black sheets in particular has not been sharply marked by the disappearance of all low prices, a distinctly firmer situation obtains. The apparent certainty of higher prices for sheet bars in the last quarter has made sheet mills more conservative in their concessions, and this market reflects the effort to secure a minimum of 3c., Pittsburgh, for open-hearth sheets and 2.90c. for Bessemer. In respect of blue annealed and galvanized sheets, quotations of last week are without change. We quote for Chicago delivery, blue annealed, No. 16 and heavier, 3.139c. to 3.339c.; box annealed, No. 17 and lighter, 2.989c. to 3.039c.; No. 28 galvanized, 4.289c. to 4.389c.

We quote for Chicago delivery of sheets out of stock, minimum prices applying on bundles of 25 or more, as follows: No. 10 blue annealed, 3.49c.; No. 28 black, 3.25c.; No. 28 galvanized, 4.65c. to 4.75c.

Bars.—With an improvement in the quantity of bar iron in orders offered to the mills, a firmer attitude is noted and some sales at 2.40c. are reported. The market, however, continues on the basis of 2.35c. The re-rolling mills are making contracts for first half with a strict adherence to the Chicago price of 2.50c. We quote mill shipment, Chicago, as follows: Bar iron, 2.35c.; soft steel bars, 2.789c.; hard steel bars, 2.50c.; shafting, in carloads, 20 per cent off; less than carloads, 15 per cent off.

We quote store prices for Chicago delivery: Soft steel bars, 3.10c.; bar iron, 3.10c.; reinforcing bars, 3.10c. base with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting 10 per cent off.

Rivets and Bolts.—Users of bolts and nuts very generally are being inconvenienced by delayed deliveries or because of inability to place orders for prompt shipment. The mills appear to be making but little progress against their backlog of orders. We quote as follows: Carriage bolts up to $\frac{3}{4}$ x 6 in., rolled thread, 50-5; cut thread, 40-10-2 $\frac{1}{2}$; larger sizes, 35-2 $\frac{1}{2}$; machine bolts up to $\frac{3}{4}$ x 4 in., rolled thread, with hot pressed square nuts, 50-10; cut thread, 50; large sizes, 40-5; gimlet-point coach screws, 50-5; hot pressed nuts, square, \$2.70 off per 100 lb.; hexagon, \$2.70 off. Structural rivets, $\frac{3}{4}$ to 1 $\frac{1}{4}$ in., 4c. to 4.15c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

We quote out of store: Structural rivets, 4c.; boiler rivets, 4.10c.; machine bolts up to $\frac{3}{4}$ x 4 in., 50-10; larger sizes, 40-10; carriage bolts up to $\frac{3}{4}$ x 6 in., 50-5; larger sizes, 40-5; hot pressed nuts, square, \$3.25, and hexagon, \$3.25 off per 100 lb.; lag screws, 55.

Wire Products.—Demand for wire nails continues to grow more rapidly than it can be accommodated by the mills, and jobbers find themselves greatly handicapped in their function of prompt delivery by reason of slow mill deliveries. The beginning of fall trade is being felt in the inquiry for barb wire, but sales of fence continue light. We quote as follows per 100 lb.: Plain wire, Nos. 6 to 9, base, \$2.839; wire nails, \$2.789; painted barb wire, \$2.939; galvanized barb wire, \$3.639; polished staples, \$2.939; galvanized staples, \$3.639; all Chicago.

Cast-Iron Pipe.—The leading interest is the low bidder for 1000 tons of pipe for the city of Chicago. Other new business of size is lacking. We quote as follows, per net ton, Chicago: Water pipe, 4-in., \$33.50 to \$34; 6-in., and larger, \$30.50 to \$31, with \$1 extra for Class A water pipe and gas pipe.

Old Material.—Prices now being quoted in this market show still further advances, but the strength of the market at the higher level is largely speculative pending the advent of consumer buying in significant quantities. The advance appears to have been built upon anticipations of an approaching buying movement made necessary by the protracted absence of the principal melters from the market, and its effectiveness will

doubtless depend upon that buying being inaugurated at an early date. There is still no great amount of scrap being offered for sale, railroad lists especially being small. Current railroad offerings include 2000 tons from the Michigan Central and 2700 tons from the Big Four. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails.....	\$18.75 to \$19.25
Relaying rails.....	19.50 to 20.50
Old carwheels.....	11.75 to 12.25
Old steel rails, rerolling.....	17.00 to 17.25
Old steel rails, less than 3 ft.....	16.50 to 17.25
Heavy melting steel scrap.....	16.00 to 16.25
Frogs, switching and guards, cut apart.....	16.00 to 16.25
Shoveling steel.....	15.50 to 15.75
Steel axle turnings.....	8.75 to 9.25

Per Net Ton	
Iron angles and splice bars.....	\$18.75 to \$19.00
Iron arch bars and transoms.....	20.00 to 20.50
Steel angle bars.....	15.25 to 15.75
Iron car axles.....	25.50 to 26.00
Steel car axles.....	28.00 to 28.50
No. 1 railroad wrought.....	16.50 to 17.00
No. 2 railroad wrought.....	15.00 to 15.50
Cut forge.....	15.00 to 15.50
Pipes and flues.....	12.00 to 12.50
No. 1 busheling.....	14.00 to 14.50
No. 2 busheling.....	9.50 to 10.00
Steel knuckles and couplers.....	14.75 to 15.00
Steel springs.....	15.25 to 15.50
No. 1 boilers, cut to sheets and rings.....	10.25 to 10.75
Boiler punchings.....	14.00 to 14.50
Locomotive tires, smooth.....	21.50 to 22.00
Machine-shop turnings.....	5.50 to 6.00
Cast-borings.....	6.50 to 7.00
No. 1 cast scrap.....	12.00 to 12.50
Stove plate and light cast scrap.....	9.75 to 10.25
Grate bars.....	10.00 to 10.25
Brake shoes.....	9.75 to 10.25
Railroad malleable.....	11.50 to 12.00
Agricultural malleable.....	11.00 to 11.50

Philadelphia

PHILADELPHIA, PA., Sept. 12, 1916.

The already heavy demand for plates took a fresh spurt four or five days ago, and since then inquiries aggregating fully 75,000 tons have been received by makers. It is assumed that consumers are seeking to cover their future requirements as a protection against the heavy demands of the Government naval program. The purchase of two large lots of basic pig iron is reported, one lot of 18,000 tons being taken by a Harrisburg consumer and another lot of several thousand tons by a Bridgeport plant. A price over the market was paid in the first instance. Foundry pig iron continues fairly active, but quotations are not as high, proportionately, as those of steel-making iron. Steel bars and structural material are as scarce as ever and prices are stiff, but building work requiring shapes shows a tendency to lag in the East. Western consumers of both plates and shapes are making inquiry in this district. Old material is quiet so far as new business is concerned.

Pig Iron.—The Harrisburg interest which was in the market for 18,000 tons of basic, first half delivery, has closed for probably the full amount at a price understood to be near \$20.50, delivered. Another lot of several thousand tons was taken by a Bridgeport consumer, also at a price not far from \$20.50, delivered. Although the already fair demand for foundry iron continues to grow better, its prices are irregular and do not show strength proportionate to those of steel-making iron, a fact which puzzles the producers. One explanation of the situation is that the shortage of labor has cut down consumption, this being demonstrated in New England. Eastern Pennsylvania No. 2 X still ranges from \$19.50 to \$20, Philadelphia, and Virginia No. 2 X at \$20.25 to \$21.25. The producer quoting the minimum is selling for last and first quarters, specifying even monthly deliveries, while \$21.25 is asked by a producer selling over the first half of 1917. The Norfolk & Western Railway has placed orders for various grades for first half delivery, including 1500 tons of Ohio malleable and 3500 tons of No. 2 X, No. 2 plain and high manganese. Two Virginia furnaces will supply 1200 tons each. In the past 10 days the producer quoting the minimum for Virginia No. 2 X has taken orders for about 14,000 tons. In the week just ended another seller has placed nearly 11,000 tons of miscellaneous grades. The stove manufacturers continue ac-

tive. Charcoal iron is not nearly so active in this city as it is in the West. Plenty of export inquiry continues to appear for standard Bessemer, also for Bessemer running better than 0.05 sulphur. Low phosphorus and occasionally basic also are wanted for export. Standard low phosphorus is strong at \$34 to \$35, delivered, and one maker reports the sale of 2000 tons. Quotations for standard brands, delivered in buyers' yards, prompt shipment, range about as follows:

Eastern Pa. No. 2 X foundry.....	\$19.50 to \$20.00
Eastern Pa. No. 2 plain.....	19.25 to 19.75
Virginia No. 2 X foundry.....	20.25 to 21.25
Virginia No. 2 plain.....	20.00 to 20.75
Gray forge.....	18.50 to 19.00
Basic.....	19.75 to 20.00
standard low phosphorus.....	34.00 to 35.00

Iron Ore.—Arrivals at this port in the week ended Sept. 9 consisted of 12,600 tons from Cuba and 7048 tons from Sweden. In the previous week 7700 tons arrived from Cuba.

Ferroalloys.—The market presents little of interest. Both foreign and domestic 80 per cent ferromanganese is held at \$175, seaboard, but domestic makers will shade this price. Fifty per cent ferrosilicon is unchanged at \$86 to \$88, Pittsburgh. There is inquiry for small lots of 11 per cent ferrosilicon, which is quoted at \$34.44, Philadelphia. A shipment of 500 tons of English ferromanganese arrived here last week.

Plates.—Inquiry received in the past four or five days aggregates fully 75,000 tons, mostly from domestic shipyards. It is believed that the great activity is due to apprehension on the part of consumers that the Government naval program may absorb so much capacity that they will be left in the lurch unless they cover their future needs at this time. The situation with regard to deliveries is as tight as ever, and is serious for smaller consumers who do not contract far ahead, unless they can pay premiums. The builders of a blast furnace recently were forced to pay a premium of \$4000 for plates. A New York boilermaker states that he may have to close his shop despite the fact that he has bought plates for 25 years from two concerns, both of which are now unable to give him the prompt deliveries he requires. While the larger mills continue to quote 4.159c., Philadelphia, as their minimum, delivery at convenience of the mill, lower can be done on contracts, probably 3.50c., Pittsburgh, or 3.659c., Philadelphia, or lower. Some comparatively low bids have been made for delivery of ship plates on the Pacific coast. One mill can make deliveries in six to eight weeks. Large tonnages of ship plates for export continue to be turned down.

Bars.—The nominal quotation for steel bars is 2.759c., Philadelphia, but up to 3.159c., Philadelphia, is quoted for Bessemer bars. Iron bars are unchanged at 2.659c., Philadelphia.

Structural Material.—New propositions are scarce, but material also is difficult to obtain. Bids have been submitted on two new hotels—at Baltimore and Washington, D. C.—but both have been held up, presumably because of the high cost of all materials. Miscellaneous inquiry is good, and again the West is looking to the East for steel. An eastern Pennsylvania mill quotes 2.759c. to 3.159c., delivery at the mill's convenience, which is stated to be in February. Nearby Bessemer shapes are quoted up to 3.659c., Philadelphia. Ship shapes, of course, are in heavy demand.

Billets.—The minimum quotation for open-hearth rerolling billets is unchanged at \$48, Eastern mill, and that for forging billets is \$65.

Sheets.—The domestic demand is lighter, but there is a good demand from abroad which is now receiving more attention. The quotations for No. 10 blue annealed range from 3.159c. to 3.659c., Philadelphia.

Coke.—Most of the foundries appear to be well supplied with coke. Spot furnace is fairly active. Quotations are unchanged as follows: Spot furnace, \$2.75 to \$2.85 per net ton at oven; contract, nominally \$2.50; spot and contract foundry, \$3.25 to \$3.50 per net ton at oven. Freight rates from the principal producing districts are as follows: Connellsville, \$2.05; Latrobe, \$1.85, and Mountain, \$1.65.

Old Material.—The market continues very quiet. Coatesville is still under embargo. A large consumer has resumed taking shipments of machine-shop turn-

ings, and these are a little stronger. The dealers are busy executing old contracts; meanwhile a great deal of scrap is being produced, and many consumers are using more than their usual quota of pig iron in place of old material. Quotations for delivery in buyers' yards in this district, covering eastern Pennsylvania and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$14.75 to \$15.25
Old steel rails, rerolling.....	17.00 to 18.00
Low phos. heavy melting steel scrap..	21.25 to 23.50
Old steel axles (for export).....	34.00 to 35.00
Old iron axles (for export).....	34.00 to 35.00
Old iron rails.....	20.00 to 20.50
Old carwheels.....	15.50 to 16.00
No. 1 railroad wrought.....	20.00 to 21.00
Wrought-iron pipe.....	13.50 to 14.00
No. 1 forge fire.....	12.00 to 12.50
Bundled sheets.....	12.00 to 12.50
No. 2 busheling.....	10.50 to 11.00
Machine-shop turnings.....	7.50 to 8.00
Cast borings.....	9.00 to 9.50
No. 1 cast.....	16.00 to 16.50
Grate bars, railroad.....	11.75 to 12.25
Stove plate.....	11.75 to 12.25
Railroad malleable.....	13.50 to 14.00

Cincinnati

CINCINNATI, OHIO, Sept. 13, 1916.—(By Wire.)

Pig Iron.—The comparatively large tonnage of Southern iron recently sold has put the furnaces of that section in a more independent position. Furnace iron this week is on the \$14.50, Birmingham, basis, and competition from Tennessee furnaces that was evident last week at \$14 for this year's shipment seems to have disappeared. Southern resale iron also appears to have become a somewhat negligible factor, as most of it is now in the hands of melters or of iron merchants who are not disposed to release their holdings below the regular market price. There is an undercurrent of feeling that Northern producers contemplate an advance over \$18, Ironton, but at the moment contracts at this price can be made for delivery through the first half of next year. Business has slackened in this vicinity, but reports from other buying centers are more encouraging. Orders recently received from nearby melters are mostly for small quantities in central Ohio, among them being 500 tons of Southern foundry taken by two separate melters for first half shipment. Indiana foundries are extending their purchases with the idea in view of carrying them through the first half. It is reported that the Standard Sanitary Mfg. Company bought 10,000 tons, with deliveries to run until June 1 of next year, about 7000 tons of which is supposed to have been placed with Southern producers. Malleable sales have been light, and there is only one lot of basic yet to be placed in this territory to fill present mill requirements through the first quarter of next year. Ohio silvery irons are stronger, but \$27 at furnace can still be done on an 8 per cent analysis. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Ironton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.....	\$17.90 to \$18.40
Southern coke, No. 2 f'dry and 2 soft.....	17.40 to 17.90
Southern coke, No. 3 foundry.....	16.90 to 17.40
Southern coke, No. 4 foundry.....	16.40 to 16.90
Southern gray forge.....	15.90 to 16.40
Ohio silvery, 8 per cent silicon.....	28.26 to 28.76
Southern Ohio coke, No. 1.....	20.26 to 20.76
Southern Ohio coke, No. 2.....	19.26 to 19.76
Southern Ohio coke, No. 3.....	18.76 to 19.26
Southern Ohio malleable Bessemer.....	19.26 to 19.76
Basic, Northern.....	19.26 to 19.76
Lake Superior charcoal.....	21.20 to 22.20
Standard Southern carwheel.....	24.90 to 25.40

(By Mail)

Coke.—Wise County producers have sold to Tennessee consumers approximately 100,000 tons of furnace coke for shipment in the next 12 months. The price is said to have been close to \$3 per net ton at oven. The foundry coke situation is unchanged, with only a few contracts reported that do not extend into next year. Prices are firm and specifications on contracts are good. Connellsville 48-hr. coke is quoted around \$2.50 to \$2.75 at oven, but Wise County and Pocahontas operators ask premiums of 10c. to 25c. per ton. With the exception of New River foundry coke, which is held at \$3.90 to \$4 at oven, the other three producing districts are about uniform at \$3.50 to \$3.75.

Finished Material.—The local warehouses have lately been almost overrun with orders. While they are ex-

periencing considerable trouble in obtaining shipments from the mills to fill the requirements of their customers, they have so far been able to make reasonably prompt deliveries on all orders received. The nearby mills are quoting No. 28 black sheets on a basis of 3c., Pittsburgh, or 3.15c., Cincinnati or Newport, Ky., and No. 28 galvanized sheets are held by them at 4.40c. to 4.50c., Pittsburgh, with the usual 15.8c. per 100 lb. freight added. The local store quotations are as follows: Steel bars and small structural shapes, 3.20c.; twisted steel bars, 3.35c.; wire nails, \$2.85 per keg base; barb wire, \$3.70 per 100 lb., and No. 10 blue annealed sheets, around 3.50c.

Old Material.—Prices on a number of grades of scrap have been advanced and more business is reported than in the previous week. The firmer attitude of pig-iron producers in the South has had something to do with the situation, but the activity is principally on account of the much better demand from consumers. All kinds of wrought scrap have also taken on an advance and the price situation is more stable than it has been for several months. The following are dealers' prices f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap.....	\$10.75 to \$11.25
Old iron rails.....	15.75 to 16.25
Relaying rails, 50 lb. and up.....	21.00 to 21.50
Rerolling steel rails.....	14.75 to 15.25
Heavy melting steel scrap.....	14.25 to 14.75
Steel rails for melting.....	13.25 to 13.75
Per Net Ton	
No. 1 railroad wrought.....	\$14.00 to \$14.50
Cast borings.....	4.50 to 5.00
Steel turnings.....	4.75 to 5.25
Railroad cast scrap.....	11.25 to 11.75
No. 1 machinery cast scrap.....	13.00 to 13.50
Burnt scrap.....	8.25 to 8.75
Iron axles.....	25.00 to 26.00
Locomotive tires (smooth inside).....	21.00 to 21.50
Pipes and flues.....	9.25 to 9.75
Malleable and steel scrap.....	11.00 to 11.50
Railroad tank and sheet scrap.....	8.50 to 9.00

Birmingham

BIRMINGHAM, ALA., Sept. 11, 1916.

Coal and Coke.—The coal trade is as active as scarcity of cars will permit. The domestic mines are recovering from a long period of inactivity and the steam coal demand is also good. Coke remains very strong, the demand taking the entire output. Few additional beehive ovens are available, hence there is little danger of a recession in prices from increased production. Shipments to Texas, the Far West and the Pacific coast have been quite brisk. There is also some coke moving to Mexico. We quote, per net ton, f.o.b. oven, as follows: Standard beehive foundry, \$4.25 to \$4.50; furnace, \$3.25 to \$3.50.

Pig Iron.—Two local iron manufacturers have sold in the past 30 days a total of 140,000 tons, comprising basic and foundry, the percentage of each not ascertainable. Combined sales of all makers must have approximated 200,000 tons, which is within 18,000 tons of the make. The Alabama Company is reported to have booked 30,000 tons in the past three weeks. Its regular foundry bookings will be taken care of by the Gadsden stack recently put in. The company making the largest sales reports a stock diminution during August, with present shipments much above its make. The leading interest does not appear to be doing much of the business. The foundry-iron makers will have a still more open field after Oct. 1, when the Woodward Iron Company will turn its No. 1 furnace on basic, for which it is billed to capacity well into 1917. Its furnace already running on basic has its capacity sold for almost a year. A third interest, heretofore an exclusively foundry-iron maker, is figuring on putting a furnace on basic. August's make of basic iron was the largest on record by 4000 tons. Steel consumption in Alabama and the South is at a maximum. One large mill is sold up practically throughout next year. Furnacemen agree in stating that \$14.50 for spot and the rest of the year may be done, with \$15 asked for 1917. Small lots have been sold for September and October at \$14.50 and \$15. Two furnace agents report that regular customers who were quoted \$14.50 did not buy, which is taken as an indication that better than \$14.50

has been done in some quarters. There is a heavy movement of iron for export, some of which was bought months ago. A considerable portion is going to Norway and Sweden. Billets and rails are regularly leaving Southern ports for foreign destinations. General indications are of a stiffening market with a greater production of basic and, in turn, greater opportunity for the foundry iron that is produced. We quote, per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft.....	\$15.00 to \$15.50
No. 2 foundry and soft.....	14.50 to 15.00
No. 3 foundry.....	14.00 to 14.50
No. 4 foundry.....	13.75 to 14.25
Gray forge.....	13.50 to 14.00
Basic.....	14.50 to 15.00
Charcoal.....	22.00 to 22.50

Cast-Iron Pipe.—The gas and water pipe shops have taken on greater activity, and yards have been well emptied by the rush shipments to the Far West. Inquiries are increasing and larger volumes are inquired for. The sanitary shops are doing only a fairly good business. We quote, per net ton, f.o.b. pipe shop yards, as follows: 4-in., \$28; 6-in. and upward, \$25, with \$1 added for gas pipe and 16-ft. lengths.

Old Material.—The market has not improved to any extent. There is a good deal of old material on hand, and the largest steel plant is making its own scrap and taking practically none from the yards. However, all the cheap pig iron that has been utilized in foundries and machine shops in place of scrap has about disappeared, and a brisker demand for scrap is looked for. Steel axles fetch a wide range of prices, according to the customer and the amount available at any one time. We quote, per gross ton, f.o.b. dealers' yards, as follows:

Old steel axles.....	\$24.00 to \$30.00
Old steel rails.....	10.00 to 10.50
No. 1 steel scrap.....	9.25 to 9.75
No. 1 wrought scrap.....	12.50 to 13.00
No. 1 cast scrap.....	9.50 to 10.00
Extra heavy cast scrap.....	9.00 to 9.50
Stove plate and light.....	8.50 to 9.00
Old carwheels.....	9.50 to 10.00
Tram carwheels.....	9.50 to 10.00

St. Louis

ST. LOUIS, MO., Sept. 11, 1916.

Pig Iron.—Although all the big consumers are out of the market, the smaller concerns are still buying or making inquiry, though somewhat hesitant about purchases as if loth to believe that prices are as firm as the furnace representatives hold them out to be. It now develops that the aggregate purchases of the large consumers recently reported reached a total in excess of 70,000 tons, additions having been made after the initial buying was done. Of this amount the local furnace took about 25,000 tons at exceptionally good prices, while in one case it is known to have made a sale of some special iron at \$22 at furnace. It is still running on foundry iron, but will shortly turn to basic to meet contracted deliveries. During the past week the sales and inquiries have run from 500 tons down, largely for first half delivery, and the total transactions have probably been about 4000 tons, exclusive of a sale of about 6000 tons of malleable delayed in being reported.

Coke.—Transactions have been in small lots at stiffly held prices in consonance with the Connellsville figures and even above where the amounts sought were small.

Finished Iron and Steel.—Finished products have been moving as freely as the constricted supply will permit and there is increasing disposition to contract if only deliveries could be obtained of a satisfactory character. Building operations are increasing both actually and in prospect. Light rails are being fairly well taken, mostly by the coal interests, the lumber concerns being out of the market for the most part. Track fastenings are in good request and all classes of material are thoroughly well specified up to contract allotments. Movement out of warehouse has been active and for such stock we quote as follows: Soft steel bars, 3.15c.; iron bars, 3.05c. to 3.10c.; structural material, 3.15c.; tank plates, 3.55c. to 3.60c.; No. 10 blue

annealed sheets, 3.45c.; No. 28 black sheets, one pass, cold rolled, 3.45c.; No. 28 galvanized sheets, black sheet gage, 4.75c. to 5c.

Old Material.—The scrap market continues strictly under the influence of dealers' operations, though there is a slight tendency on the part of rolling mills and steel mills to take some interest. Most of the transactions are those of dealers taking care of their short sales, though all are acting in the confident expectation of a better market and even higher prices than those which are now quoted. Relaying rails, standard section, are practically out of the market because of lack of supply, though the demand is very heavy. Light rails are easier than standard sections though in short supply compared with requirements. Lists out during the week included the Big Four, 4500 tons; Missouri, Kansas & Texas, 2500 tons; Wabash, 3000 tons; Cotton Belt, 300 tons, Chicago & Alton, 600 tons; Terminal Association, 500 tons; Southern Railway, 3500 tons, and Vandalia, 500 tons. The Frisco and Missouri Pacific are selling from day to day as accumulations are acquired. Altogether the railroad offerings are heavy, but in spite of this the dealers' speculation and the confident optimism are holding prices at a high level. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails.....	\$17.25 to \$17.50
Old steel rails, rerolling.....	16.00 to 16.50
Old steel rails, less than 3 ft.....	16.00 to 16.50
Relaying rails, standard section, subject to inspection.....	23.00 to 24.00
Old carwheels.....	12.00 to 12.50
No. 1 railroad heavy melting steel scrap.....	15.00 to 15.50
Heavy shoveling steel.....	14.00 to 14.50
Frogs, switches and guards cut apart.....	15.00 to 15.50
Bundled sheet scrap.....	8.00 to 8.50
Per Net Ton	
Iron angle bars.....	\$16.00 to \$16.50
Steel angle bars.....	14.00 to 14.50
Iron car axles.....	26.50 to 27.00
Steel car axles.....	27.50 to 28.00
Wrought arch bars and transoms.....	21.00 to 21.50
No. 1 railroad wrought.....	16.00 to 16.50
No. 2 railroad wrought.....	15.25 to 15.75
Railroad springs.....	15.00 to 15.50
Steel couplers and knuckles.....	14.50 to 15.00
Locomotive tires, 42 in. and over, smooth inside.....	20.50 to 21.00
No. 1 dealers' forge.....	10.25 to 10.75
Cast-iron borings.....	7.00 to 7.50
No. 1 bushing.....	13.50 to 14.00
No. 1 boilers, cut to sheets and rings.....	10.25 to 10.50
No. 1 railroad cast scrap.....	11.75 to 12.00
Stove plate and light cast scrap.....	9.25 to 9.50
Railroad malleable.....	11.00 to 11.50
Agricultural malleable.....	10.00 to 10.50
Pipes and flues.....	11.00 to 11.50
Heavy railroad sheet and tank scrap.....	11.00 to 11.25
Railroad grate bars.....	9.50 to 10.00
Machine shop turnings.....	7.00 to 7.50

San Francisco

SAN FRANCISCO, CAL., Aug. 31, 1916.

The past month has brought out heavy specifications in all lines on which delivery could be made before Sept. 1, and there has also been some new buying for prompt shipment. This was entirely attributable to the prospect of advanced freight rates and interruption of rail service, which led local buyers to get as much as possible of their third and fourth quarter stock into their hands. The distributive movement in the building trades and among small consumers has been comparatively light, with a general tendency to hold expenditures down as closely as possible during the period of high prices, though the requirements of shipbuilders and other manufacturers, mining industries, etc., continue very large.

Bars.—Foreign inquiries are increasing again, though no great tonnage has yet been placed. Local mills report plenty of business in nearby territory, and are helped somewhat by the recent Eastern advance. They are gradually improving their service in the matter of assortments, but are still slow on deliveries. The tonnage of iron bars keeps up well. Reinforcing material is in good demand in outside territory, but local building requirements are dwindling. Resale prices on small lots remain at 4c. for steel and 3.90c. for iron. Steel bars from the Steel Corporation's warehouse in carloads to the trade are 3.80c.

Structural Material.—Most local fabricators are op-

erating in a small way on an open-shop basis, no plants of much importance having complied with the union demands. No great effort is being made to get new work; and, indeed, there is little to be had, aside from the usual scattering of insignificant jobs. The high cost of materials has nearly put a stop to speculative construction of large office or business buildings, but there are some inquiries for bridges and industrial buildings. Business in shapes is coming mainly from shipbuilders and manufacturers, who are keeping their requirements covered for many months ahead and have endeavored to accumulate some surplus tonnage the past month. Shapes in carloads from local warehouse to the trade are held at 3.85c. The Schrader Iron Works has taken an apartment-house contract on Leavenworth Street near Sutter. Preliminary surveys have been made for a bridge on the Sacramento River near Rio Vista. Plans will appear shortly for a new library at Sacramento, Cal., and competitive designs are to be submitted soon for the State building in this city. The Palm Iron Works, Sacramento, has 100 tons for the Anderson-Cottonwood Irrigation District. The town of Kelso, Wash., is considering plans for a \$55,000 steel bridge; Seattle is figuring on a new \$50,000 bridge on the West Waterway, and San Diego, Cal., is preparing plans for a \$40,000 bridge.

Rails.—Heavy rail business in California is quiet, though there is a fair amount of activity in the north coast States. Inquiries for light rails are numerous, but most buyers are looking for relayers, of which a large tonnage has been sold at rather high prices. The city of San Francisco has ordered 420 tons of 70-lb. rails for the Twin Peaks tunnel from the United States Steel Products Company.

Plates.—Expansion of shipbuilding plants continues at all important Pacific ports and, while business is retarded by shortage of material, there is considerable contracting for distant delivery. The riveted pipe business is also fairly active, with several important municipal and irrigation inquiries. Oil interests are also buying on a fairly liberal scale. Los Angeles County has taken figures on about 8000 tons of pipe, 8 to 54 in., the larger sizes to be riveted. Plates from the local warehouse in carloads to the trade are quoted at 4.30c., the jobbing price on small lots being 4.75c.

Sheets.—The movement of galvanized sheets is greatly restricted, prices being still too high to permit the customary use of this material in building. A little inquiry is noted for black sheets, but they are always an insignificant item in this market. Blue annealed are moving fairly well to manufacturers and large consumers, but the jobbing demand is light. No. 10 blue annealed sheets from store in small lots are held at 5c.

Wrought Pipe.—Oil-country business continues to show a fairly healthy activity without any great rush. There is some talk of a new line for the Shell Company. A few important waterworks inquiries have recently appeared. While merchants are well stocked, the last few weeks have brought a little spurt in orders for prompt shipment of small pipe. General plumbing requirements, however, are below normal.

Cast-Iron Pipe.—Buyers have been endeavoring to accelerate deliveries as much as possible, but the car shortage has held back many shipments. The town of Glendale, Cal., has ordered about 1000 tons, and Santa Monica, Cal., will shortly take bids for a large water system bond issue. Madera, Cal., has taken bids for 1600 ft. of 6-in.

Pig Iron.—Local melting requirements are hardly as large as a few months ago, but in anticipation of the freight advance Sept. 1 an exceptionally heavy tonnage has been brought in during the last month and heavy stocks have been accumulated. There is little new business, and nothing important either in new contracts or shipping orders is expected for some time. More firmness is noted as to values, No. 1 Southern foundry iron being quoted here at \$26.50 to \$27 per gross ton.

Coke.—Aside from the heavy tonnage recently shipped in on contracts the market is quiet, most foundries being supplied for several months. Durham coke is now held at \$16.75 per net ton, with some Southern brands offered at \$15.75.

New York

NEW YORK, Sept. 13, 1916.

Pig Iron.—While the market does not show as many large transactions as have been reported in the past two or three weeks, the activity keeps up, and between foreign and domestic inquiries and sales sellers are kept busy. Pennsylvania furnaces have done rather more of the late business than those at Buffalo. Prices are practically the same, what change there is being in the rather firmer position of furnaces that have been known as low sellers in recent weeks. About \$19 at Pennsylvania furnace for No. 2 X foundry is the basis. The American Locomotive Company's inquiry for 5000 tons seems not to have ended in contracts. Whether the company has withdrawn from the market for the present does not appear. A Newark foundry has bought 2000 tons of high silicon iron (3.25 to 3.75 per cent) for delivery in the first half of next year. In New England the purchase of 6000 tons of basic by a Connecticut interest is the largest transaction. There has been some sale of foundry iron there and a malleable foundry is inquiring for 1000 tons. In New York and immediate vicinity several inquiries from pipe foundries have come up, two being for soil pipe plants, one of them for Southern iron. The third is from a water pipe foundry which will probably take 2000 to 4000 tons for the first half. A New York State coupler works is in the market for 3000 to 5000 tons of malleable, deliveries to begin in October at the rate of 700 tons a month. The export inquiry is persistent and for a variety of irons from various countries. Norway recently bought 1000 tons. Italy and Holland are inquiring, the former for Bessemer iron and the latter for foundry. Quite a little low phosphorus and basic iron is wanted for England. Japan is also in the market for low phosphorus, as is also Canada. Probably 25,000 tons of export iron is before the trade and 10,000 tons of this is likely to be bought soon. Practically all the export iron is for early delivery. Vessel room is the principal problem. Holland's recent purchases have amounted to 5000 tons, and Switzerland took 2000 tons. We quote at tidewater for early delivery: No. 1 foundry, \$20 to \$20.50; No. 2 X, \$19.50 to \$19.75; No. 2 plain, \$19.25 to \$19.50; Southern iron at tidewater, \$19.25 to \$19.75 for No. 1 and \$18.75 to \$19.25 for No. 2 foundry and No. 2 soft.

Ferroalloys.—Inquiries for ferromanganese are more numerous. Domestic consumers are asking for about 6000 tons, while foreign buyers want 2000 to 3000 tons. The delivery desired in each case is for last quarter and for 1917, with new inquiry for the latter. Small lots for early delivery have been sold at the regular quotation of \$175, seaboard, with small sales for foreign consumption bringing a higher price. While \$175 can probably be shaded, there is a belief that the great consumption, as well as the indication of an increase as 1917 approaches, rather than a decrease, will result in a stiffening of prices. Spiegeleisen is quiet at \$45 to \$50, furnace, so far as domestic inquiry is concerned. Foreign inquiries represent about 3000 tons, with little prospect that it can be obtained. Ferrosilicon, 10 per cent, is \$30, furnace, with about \$2 additional for each 1 per cent increase in silicon. High grade ferrosilicon is in active demand, with specifications on contracts insistent.

Structural Material.—About 31,000 tons of steel for various new enterprises is before the market, but the closing of contracts has been slow. One fabricator reports that he is booked up well into 1917, but that the general and marked inefficiency of labor is a distinct handicap, resulting in a production of not more than 60 per cent of what it usually is when the labor market is normal and business is prosperous. This is regarded as typical of the entire situation. New business is not of large volume, but enough is appearing each week to keep fabricators busy. New propositions not heretofore reported include 600 tons for a telephone building, Springfield, Mass.; 200 tons for a freight house for the Pennsylvania Railroad at Harrisburg, Pa.; 300 tons for an addition to the Vanderbilt Concourse Building; 900 tons for a trading school for girls, New York City,

already before the general contractors; 300 tons for a bridge for the Pennsylvania Railroad at Trenton, N. J., bids for which are already in; 200 tons for a small bridge for the Pennsylvania Railroad, with other railroads also inquiring for small bridges. A nine-story apartment, located at Seventy-second Street near Park Avenue, for which Schwartz & Gross are architects, was placed before the market to-day, but the tonnage required was not mentioned. The 6000 to 7000 tons for the Southern Railroad is still up for bids. The American Bridge Company has bid on 700 tons for a bridge for the Chesapeake & Ohio Railroad. New contracts recently awarded are reported as follows: To the Chesapeake Iron Works, 400 tons for a boiler house for the Consolidated Gas Company, Baltimore; to the American Bridge Company, 200 tons for six bridges for the Pennsylvania Railroad; to Levering & Garigues, 800 tons for the C. H. Ditson Building, Boston, and to the Hay Foundry & Iron Works, 450 tons for the West End Company's apartment on West Eighty-sixth Street. We quote mill shipments of plain structural material at 2.769c. to 3.019c., New York, for delivery in two to three months, with store material at 3.25c.

Plates and Bars.—A Maine shipyard is in the market for 10,000 tons of plates and will take delivery in the last half of 1917 if necessary. Japan is inquiring for two lots of 2600 tons and 3500 tons, respectively, and the general demand for odd lots is brisk for both plates and bars. Inquiries are already appearing for plates, forgings, etc., in connection with the new Government naval program and it is believed that this is acting as a stimulant to other domestic buyers, tending also to stiffen the market. Most mills are booked far ahead, with very little to offer for early delivery. Foreign inquiries continue to appear and domestic consumers, especially of ship plates, are more active in getting protection. Universal plates can generally be obtained at from \$5 to \$10 per ton less than sheared plates. Car inquiries are very few. It is reported but not confirmed that the Pullman Company has taken an order for 1000 cars for the Western Pacific. Steel bars are quoted at 2.769c. for delivery at convenience of the mill, and as high as 3.169c. for, say, three months, and limited largely to Bessemer steel; bar iron is quoted at 2.669c. and steel plates at 3.169c. to 4.169c., the wider the plates and the earlier the delivery, the higher the price. Out of store iron and steel bars at 3.25c., New York; plates are 4c.

Cast-Iron Pipe.—The only public letting announced in this vicinity is that of New York City, which will open bids on Friday of this week on 218 tons of 12-in. While municipal business continues extremely backward, private buying is of fair proportions. Prices are firm. Carload lots of 6-in., class B and heavier, are quoted at \$30.50 per net ton, tidewater, class A and gas pipe taking an extra of \$1 per ton.

Old Material.—Aside from the export demand for specialties, the market is quiet. Practically nothing can be done with steel companies in eastern Pennsylvania, while the iron rolling mills are only taking moderate quantities of certain classes of wrought scrap. The demand from Western consumers has almost completely disappeared. Brokers quote buying prices for the Eastern trade about as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (eastern Pennsylvania specifications).....	\$11.75 to \$12.00
Old steel rails (short lengths) or equivalent	12.50 to 12.75
Relaying rails	27.50 to 28.00
Relaying rails (for export).....	30.00 to 32.00
Rerolling rails	16.75 to 17.00
Rerolling rails (for export).....	19.00
Iron car axles (for export).....	35.00
Steel car axles (for export).....	37.00
No. 1 railroad wrought.....	18.00 to 18.25
Wrought-iron track scrap.....	15.50 to 16.00
No. 1 yard wrought, long.....	13.50 to 14.00
No. 1 yard wrought, short.....	11.75 to 12.00
Light iron (nominal).....	3.50 to 4.00
Cast borings (clean).....	7.00 to 7.25
Machine-shop turnings (nominal).....	4.50 to 4.75
Mixed borings and turnings (nominal).....	4.50 to 4.75
Wrought pipe	11.50 to 12.00
Old carwheels (nominal).....	15.00 to 15.50
Malleable cast (railroad).....	12.00 to 12.50

Foundries are buying a little more freely, but no inquiries are being received for forward delivery.

Dealers' quotations to consumers of cast scrap are as follows:

No. 1 cast (machinery).....	\$15.75 to \$16.00
No. 2 cast (heavy).....	14.00 to 14.50
Stove plate	11.50 to 12.00
Locomotive grate bars.....	10.00 to 10.25

Cleveland

CLEVELAND, OHIO, Sept. 12, 1916.

Iron Ore.—An Eastern consumer has an inquiry out for a large tonnage of non-Bessemer Lake Superior ore for next season's delivery. If this purchase is made at the present time it will doubtless be at a price to be fixed later. Quite a few additional reservations are being made for both Bessemer and non-Bessemer ores. There is little if any falling off in the ore movement, and shippers are taking all the wild tonnage that is being offered. While the going rate remains at \$1, as high as \$1.50 free is being asked for vessel capacity for October. Receipts at Lake Erie docks in August amounted to 8,051,827 gross tons out of total shipments of 9,850,140 tons. The dock balance Sept. 1 was 5,845,228 tons, or 1,343,000 tons less than on the corresponding date a year ago, showing the proportion of the direct shipments to the furnaces to be much larger this year than usual. It is expected that the dock balance Dec. 1 will be about 1,000,000 tons behind last year. We quote prices as follows, delivered lower Lake ports: Old-range Bessemer, \$4.45; Mesaba Bessemer, \$4.20; old-range non-Bessemer, \$3.75; Mesaba non-Bessemer, \$3.55.

Pig Iron.—The market is quite active and firm. Northern Ohio foundries are buying freely for their first half requirements. The Westinghouse Electric & Mfg. Company has purchased about 6000 tons of foundry iron for delivery during the first and second quarters, dividing the business between Cleveland furnaces at \$18.50 at furnace for No. 2, and \$18 for No. 3. Several other sales in lots up to 1000 tons are reported, and a number of new inquiries are pending. Local prices are unchanged at \$18.50 at furnace for No. 2. There is considerable inquiry for basic, Bessemer and malleable iron, and a local interest has taken on some additional Bessemer and malleable iron for export. The leading sanitary interest, which has covered for its last and first-quarter requirements, has included in its purchase about 10,000 tons of Southern iron, taken at \$14.50, Birmingham, for both deliveries. The Southern market is now firmer, and it is claimed that No. 2 foundry cannot now be had for delivery after the first of the year below \$15, \$14.50 being the general quotation for the last quarter. The firmness in Northern foundry iron is attributed to the advance in Southern prices. Silvery iron has become fairly active, sales being made at \$27 at furnace, for 8 per cent. We quote, delivered Cleveland, as follows:

Bessemer	\$21.95
Basic	18.95
Northern No. 2 foundry.....	18.80
Southern No. 2 foundry.....	\$18.50 to 19.00
Gray forge	18.50
Jackson Co., silvery, 8 per cent silicon.....	28.62
Standard low phos., Valley furnace.....	33.00

Coke.—There is a scarcity of both furnace and foundry coke for prompt shipment and prices are firm. Some demand has sprung up for prompt shipment of foundry coke. We quote standard Connellsville foundry coke at \$3.25 to \$3.50 per net ton at oven for prompt shipment and contracts, although most producers are asking higher prices. Standard furnace coke is held at \$2.90 to \$3 for prompt shipment.

Finished Iron and Steel.—There is still a fairly heavy demand for steel bars and structural material for early delivery. There is also considerable demand for wire rods, which have sold as high as \$65 for prompt shipment. Specifications are heavy, but new inquiry for contracts is light, although many consumers have not covered for their first quarter requirements. Plates continue in good demand with prices ranging from 4c. to 4.50c., Pittsburgh, for early delivery. Steel shell discards are in good demand and this steel is being sold at \$35 by a local mill. A Youngstown mill is reported to have sold a round tonnage of discards for

rolling into sheets. The hard steel-bar market is still irregular, and while some mills are holding to 2.50c., sales have been made at as low as 2.40c., delivered, Cleveland. An order for 1000 tons of hard steel bars for approaches to the Superior Avenue viaduct, Cleveland, is pending, the contract for this work having been placed with the Bates & Rogers Construction Company, Chicago. The only new structural inquiry is for 1000 tons for an extension to the John Harkness Brown Building, Cleveland, bids for which will be received Friday. Bar iron is quoted at 2.40c. to 2.50c., Cleveland. The demand for sheets is fairly heavy. The call for black sheets in light gages from manufacturers of roofing and other products and from jobbers has improved materially. Prices are firm. Most mills are holding to 3c. for black sheets. We quote sheets at 2.90c. to 3c., Ohio mill, for No. 28 black; 2.90c. to 3.30c. for No. 10 blue annealed, and 4.15c. to 4.50c. on No. 28 galvanized. Warehouse prices are 3.25c. for structural material; 3.65c. for plates, and 3.25c. for iron bars.

Bolts, Nuts and Rivets.—Bolt and nut specifications are heavy, but not a great deal of new business is coming out at present. Local manufacturers report some price shading in the Chicago district, mostly by jobbers. Some rivet business has been taken for the first quarter delivered at the price prevailing for the last quarter. We quote rivets at 4c., Pittsburgh, for structural and 4.10c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, $\frac{3}{4}$ x 16 in., smaller or shorter, rolled thread, 50 and 5; cut thread, 40, 10 and $2\frac{1}{2}$; larger or longer, 35 and $2\frac{1}{2}$; machine bolts within h. p. nuts, $\frac{3}{4}$ x 4 in., smaller and shorter, rolled thread, 50 and 10; cut thread, 50; larger and longer, 40 and 10; lag bolts, gimlet or cone point, 50 and 5; square h. p. nuts, blank or tapped, \$2.70 off the list; hexagon h. p. nuts, blank or tapped, \$2.70 off; c. p. c. and t. sq. nuts, blank or tapped, \$2.40; hexagon nuts, all sizes, \$2.80 off; cold pressed semi-finished hexagon nuts, all sizes, 60 and 5.

Old Material.—The market continues very dull, but is somewhat firmer. Dealers are hopeful of an advance next month and are selling very little material except that on track. Trading is almost entirely between dealers. The sale of small lots of heavy melting steel is reported for Massillon delivery. Cleveland dealers have marked up local prices on heavy melting steel 50c. per ton, and this grade is quoted at \$16.25 to \$16.75 for delivery in the Valley and at other northern Ohio points. Other local prices are unchanged. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Steel rails	\$14.75 to \$15.00
Iron rails	18.50 to 19.00
Steel car axles.....	32.00 to 33.00
Heavy melting steel.....	15.50 to 16.00
Carwheels	12.75 to 13.00
Relaying rails, 50 lb. and over.....	22.50
Agricultural malleable	12.50 to 12.75
Railroad malleable	14.00 to 14.25
Steel axle turnings.....	12.00 to 12.50
Light bundled sheet scrap.....	12.00 to 12.25

Per Net Ton	
Iron car axles.....	\$24.00 to \$25.00
Cast borings	5.75 to 6.00
Iron and steel turnings and drillings.....	5.25 to 5.50
No. 1 busheling.....	11.00 to 11.25
No. 1 railroad wrought (nominal).....	15.00 to 15.50
No. 1 cast.....	13.00 to 13.50
Railroad grate bars.....	10.00 to 10.50
Stove plate	10.00 to 10.25

Buffalo

BUFFALO, N. Y., Sept. 12, 1916.

Pig Iron.—There has been a resumption of buying activity from the lull reported last week, or at least a resumption of inquiry from users of pig iron earnestly seeking to place orders. The majority of the furnaces of the Buffalo district, however, are almost entirely sold up for the remainder of the year and for first quarter and half of 1917, two of the principal producers being practically out of the market. Of the nine merchant stacks of the district, it now looks as though hardly more than two of them may be relied upon (and this in part only) to supply the needs of melters over an extended period. According to report, one interest is booking orders steadily day by day for 1917 delivery equal to its full daily output. If this situation con-

tinues there remains but one available merchant stock for Buffalo district needs that may later develop. Orders the past week have been composed of about two-thirds foundry and malleable and one-third basic. Prices have stiffened to such an extent that differentials between grades have practically disappeared, the minimum for all grades being \$19. The maximum for the high grades remains the same as previously reported. We quote, first quarter and half delivery, f.o.b. furnace, Buffalo, as follows:

No. 1 foundry	\$19.00 to \$20.00
No. 2 X foundry	19.00 to 19.50
No. 2 plain	19.00 to 19.25
No. 3 foundry	19.00
Gray forge	19.00
Malleable	19.00 to 19.50
Basic	19.00 to 20.00
Bessemer	21.00 to 21.50
Charcoal, regular brands and analysis	21.00 to 22.00

Finished Iron and Steel.—Such buyers as have been able to place contracts for future delivery are specifying for their monthly quotas far in advance of the time specifications are due. Inquiry in all lines of finished products is large, coming in in increasing volume. It is not unlikely that a good many projects will have to be dropped or postponed owing to shortage of finished steel and inability to secure requisite quantities by the time required. Prices are firmly held.

Old Material.—There has been considerable improvement in demand during the week, particularly in heavy melting steel and in steel axles for export. Prices are held stiffly, with a tendency toward an advance in some lines but not sufficiently so to change quotations. Dealers, however, anticipate early advances, especially in such lines as move in sympathy with pig iron. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel	\$15.50 to \$16.00
Low phosphorus steel	20.00 to 20.50
No. 1 railroad wrought scrap	17.25 to 17.75
No. 1 railroad and machinery cast scrap	15.50 to 16.00
Steel axles	30.00
Iron axles	24.00 to 24.50
Carwheels	13.00 to 13.50
Railroad malleable	15.00 to 16.00
Machine shop turnings	6.00 to 6.50
Heavy axle turnings	12.00
Clean cast borings	7.50 to 7.75
Iron rails	18.00 to 18.50
Locomotive grate bars	11.50 to 12.00
Stove plate (net ton)	11.00 to 11.50
Wrought pipe	12.00 to 12.50
Bundled sheet scrap	11.50 to 12.00
No. 1 busheling	13.00 to 13.50
No. 2 busheling	11.00 to 11.50
Bundled tin scrap	15.00 to 15.50

Pittsburgh

PITTSBURG, PA., Sept. 12, 1916.

Conditions in the steel trade show no important change. The new demand for pig iron is heavier, and prices on basic seem to be in line for an advance. The scarcity of semi-finished steel in the forms of billets and sheet bars still exists, but it is not believed to the same extent as a month or more ago. While mills are not quoting actively, they are holding what steel they can spare at the high prices that have ruled for some time. An advance of \$1 per ton on black butt-weld pipe, \$4 on black lap weld and \$4 on steel and iron boiler tubes has been made, effective from Sept. 7. On other lines of finished steel products prices are remarkably strong, and buyers are placing contracts quite actively for delivery in first quarter and first half of next year.

Pig Iron.—There is a good deal more inquiry for both Bessemer and basic. A leading dealer bought recently 10,000 tons of basic for delivery over first half of 1917 at \$18.50, Valley furnace, the higher price having been paid on account of the extended delivery. The Brier Hill Steel Company bought last week 20,000 tons of basic from a Youngstown furnace for delivery over the remainder of the year, and into first quarter, for which \$18, or slightly higher, was paid. A consumer in the Wheeling district is inquiring for 10,000 to 12,000 tons of basic and a local consumer is inquiring for 5000 to 10,000 tons. The movement in foundry iron

is active, the Standard Sanitary Mfg. Company having bought 25,000 to 26,000 tons, of which 17,000 tons to 18,000 tons is Southern iron, for its works in Louisville, Ky., New Brighton, Pa., and North Side, Pittsburgh. Deliveries are last quarter this year and first quarter 1917. For the Southern iron as high as \$14.50, Birmingham, was paid, and on the Northern iron up to \$18.50, Valley, for No. 2. The Westinghouse Electric & Mfg. Company will probably buy 20,000 to 25,000 tons of foundry for its Cleveland works if the prices named by the furnaces are satisfactory. An inquiry is in the market for 4000 tons of high silicon Bessemer iron, and a Youngstown consumer is about closing for 15,000 to 20,000 tons of basic. It would be impossible to buy basic iron for delivery in first half of 1917 at less than \$18.50 at furnace, and some sellers will not meet that price. It is also doubtful whether any more basic iron for delivery this year could be had at \$18. In the absence of any sales as yet above \$18 for this year's delivery, we continue to quote basic iron \$18, Valley furnace, for this year, and \$18.50 for first quarter and first half of 1917. We quote standard Bessemer iron at \$21; No. 2 foundry, \$18.50; malleable Bessemer, \$18.50, and gray forge, \$17.75 to \$18, all at Valley furnace, the freight rate to the Pittsburgh and Cleveland districts being 95c. per ton.

Billets and Sheet Bars.—Much interest attaches to the price for sheet bars to be charged the tin-plate and sheet mills for last quarter of this year. For the present quarter the price ranges from \$37 to \$40, and it is said that for last quarter it will be at least \$3 per ton higher. This will be taken up by the steel companies with the mills not later than Sept. 20. Some large consumers are getting sheet bars at a flat price up to the end of the year, said to be somewhat under \$40, and of course this will not be changed. The new inquiry for semi-finished steel is still very active. Some of the large steel companies are buying small ingots from steel casting plants, and then breaking them down and rolling them into sheet bars after reheating. Prices on steel depend altogether on the party that is offering it, the kind of steel it is and the quantity. Recently some steel changed hands from dealers to consumers around \$42 to \$43, but the mills are quoting \$45 to \$46 and higher. None of the mills would quote billets and sheet bars at less than \$45, and some are refusing to quote at all, stating they need their entire output for their own finishing mills. Soft Bessemer and open-hearth billets and sheet bars are nominally \$43 to \$45, but steel has sold above this price, and probably below it. Mills do not quote less than \$45, and a Cleveland maker is quoting billets and sheet bars at \$46, Cleveland. We quote forging billets at \$69 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25, the regular extras being charged for larger sizes and higher carbons. Forging billets running above 0.25 and up to 0.60 carbon take \$1 extra.

Sheets.—We continue to note a heavy demand for galvanized and blue annealed sheets, which is serving to some extent in maintaining prices on these grades. Inquiries from railroads are fairly large and mills report specifications against contracts active. We quote Nos. 9 and 10 blue annealed sheets at 2.90c. to 3c., for delivery at convenience of the mill. No. 28 Bessemer and open-hearth black sheets, 2.90c. to 3c.; No. 28 galvanized, Bessemer, and open-hearth, 4.15c. to 4.25c.; Nos. 22 and 24 black plate, tin-mill sizes, H. R. & A., 2.90c.; Nos. 25, 26 and 27, 3c. to 3.10c.; No. 28, 3.10c. to 3.15c., and No. 29, 3.20c. to 3.25c. These prices are for carloads and larger lots, f.o.b. mill, Pittsburgh.

Tin Plate.—Pressure on the mills for deliveries is still very heavy and growing more insistent. There is also pressure from consumers to have mills take orders for first quarter and first half delivery, but in most of these cases the mills are refusing to quote. A fairly large lot of tin plate has been sold for the Pacific coast trade for delivery in first quarter of 1917, the price to be fixed later. Export inquiry is heavy and it is very evident that deliveries on some contracts will run over into next year. None of the mills talks less than \$5.50 per base box on contracts for 1917 delivery, and some think the price should be \$6. To regular customers mills

are quoting tin plate from stock at \$5.50, while production tin plate is quoted at \$5.75 and up to \$6 to the domestic trade. For export, \$6 to \$6.25 per base box is quoted. We quote 8-lb. coated ternes at \$8.50 to \$8.75 for 200 lb., and \$8.75 to \$9 for 214 lb., Pittsburgh.

Ferroalloys.—It is stated that some users of ferrosilicon have covered through the entire half of 1917, one consumer taking 3000 tons, another about 3500 tons, and others smaller amounts. The new demand for ferromanganese is more active, foreign being held at \$175, seaboard, but domestic is offered at \$5 to \$10 per ton under this price. We quote 18 to 22 per cent spiegeleisen at \$40 to \$45, and 25 to 30 per cent \$55 to \$65, at furnace. On 50 per cent ferrosilicon we quote \$88 to \$89 in lots up to 100 tons; over 100 tons, \$87 to \$88; and over 600 tons, \$86 to \$87, all per gross ton, f.o.b. Pittsburgh. We quote Bessemer ferrosilicon as follows: 9 per cent, \$30; 10 per cent, \$31; 11 per cent, \$32; 12 per cent, \$33; 13 per cent, \$34.50; 14 per cent, \$36.50; 15 per cent, \$38.50; and 16 per cent, \$41. Seven per cent silvery is \$28.50; 8 per cent, \$29; 9 per cent, \$29.50; 10 per cent, \$30; 11 per cent, \$31; and 12 per cent, \$32. These prices are f.o.b. furnace, Jackson or New Straitsville, Ohio, or Ashland, Ky., all having a freight rate of \$2 per gross ton to Pittsburgh.

Structural Material.—The new inquiry continues to be quite active. The American Bridge Company has taken 1850 tons for extensions to the open-hearth steel plant of the Pittsburgh Crucible Steel Company, Midland, Pa., and 700 tons for a steel bridge for the Pittsburgh & Lake Erie Railroad over the Beaver River at Beaver, Pa., and the McClintic-Marshall Company has taken 1500 tons for a Southern Railway bridge. It is stated that the Westinghouse Machine Company, which recently received bids on 6000 tons of steel for its proposed new plant at Essington, Pa., near Philadelphia, has about decided not to go ahead with this project for the present on account of the high prices submitted and the long time named for deliveries. Export inquiry is still heavy, and a local mill is credited with having taken about 15,000 tons more of plain material for delivery in second quarter of next year. We quote beams and channels up to 15 in. at 2.60c. to 2.75c. at mill for such deliveries as the mills can make, which would likely be in the early part of 1917, while small lots from stock for fairly prompt shipment bring 3c. and higher, Pittsburgh.

Steel Rails.—Only small scattering orders for standard sections are being placed. The new demand for light rails is active from the coal mining and lumber interests, much of the new business being placed going to the rerolling rail mills, which are quoting lower prices than the mills that roll light rails from billets. We quote 25 to 45 lb. sections at \$47; 16 and 20 lb., \$48; 12 and 14 lb., \$49; and 8 and 10 lb., \$50, in carload lots, f.o.b. at mill, the usual extras being charged for less than carload lots. We quote standard section rails of Bessemer stock at 1.47½c., and of open hearth 1.56½c., Pittsburgh.

Plates.—The new inquiry for steel cars is a little more active, but some of the larger inquiries have been withdrawn on account of the high prices quoted. The New York, Chicago & St. Louis is in the market for 500 40-ton steel frame automobile cars, and the Western Pacific is inquiring for 1000 wooden box cars, 1000 stock cars and 150 steel hopper cars. It is reported that the Chicago, Milwaukee & St. Paul will buy 5000 miscellaneous cars, but this is not confirmed. The Minneapolis & St. Louis has withdrawn its recent inquiry for 500 to 1000 box cars, and the Carnegie Steel Company has taken similar action on its inquiry for 88 steel hoppers, 70 gondolas and 15 flat cars. It is said some of the large steel car companies will soon be short of work, as they have received few new orders for steel cars for a long time. Indications are that the great scarcity in plates will run into next year, partly owing to the expected heavy buying by the Government for its naval program, and still higher prices are predicted. The minimum mill price on ¼-in. and heavier sheared plates is 3c. for delivery in first quarter and first half of 1917. For delivery in two to four months, ¼-in. and heavier plates are quoted from 3.75c. up to 4.50c. at mill.

Cold-Rolled Strip Steel.—The pressure from consumers on makers of cold-rolled strip steel to book their contracts for first half of 1917 delivery has become very strong, and it is likely some makers will open their books in a short time for such contracts. Consumers are largely covered for this year, but it is stated that as yet none of the makers has sold for delivery into next year. Several small contracts for shipment this year have been made at \$6 base. We quote cold-rolled strip steel at \$6 base on contracts for delivery over the remainder of the year, and \$6.50 to \$6.75 in small lots for fairly prompt shipment. Terms are 30 days net, less 2 per cent off for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Wire Rods.—The active demand for rods is greater than the supply, and prices are very firm. On some special grade rods for export delivery one maker quoted above \$60 per ton at mill. Most domestic consumers are covered for the remainder of this year and into first quarter and first half of next year at prices ranging from \$50 to \$60 per ton on soft Bessemer and open-hearth rods. The price of \$50 was made in only a few cases to consumers whose products enter into direct competition with mills that furnish them rods. We quote soft Bessemer, open-hearth and chain rods, at \$55 to \$60 per ton, f.o.b. Pittsburgh, and it would be a very exceptional case to secure the \$50 price.

Nuts and Bolts.—Most consumers are covered over the remainder of this year, but the new demand is still quite active and makers are back in deliveries eight to ten weeks or longer. Prices are very firm and may be advanced in the near future. Makers claim that with steel bars at 2.60c. and higher there is little profit in nuts and bolts at present prices. The discounts are as follows, delivered in lots of 300 lb. or more, where the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 50 and 5 per cent; small, cut thread, 40, 10 and 5 per cent; large, 35 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 and 10 per cent; small, cut thread, 50 per cent; large, 40 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 and 10 per cent; large, 35 per cent. Blank bolts, 40 and 5 per cent. Bolt ends, h. p. nuts, 40 and 5 per cent; with c. p. nuts, 35 per cent. Rough stud bolts, 15 per cent. Lag screws (cone or gimlet point), 50 and 5 per cent.

Forged set screws and tap bolts, 10 per cent. Cup and round point set screws, case-hardened, 60 per cent. Square or hexagon head cap screws, 55 per cent. Flat, button, round or fillister head cap screws, 30 per cent.

Nuts, h. p. sq., tapped or blank, \$2.70 off list; hex., \$2.70 off. Nuts, c. p. c. and t. sq., tapped or blank, \$2.40 off; hex., \$2.80 off. Semi-finished hex. nuts, 60 and 5 per cent. Finished and case-hardened nuts, 60 and 5 per cent.

Rivets, 7/16 in. in diameter and smaller, 45, 10 and 5 per cent.

Rivets.—The new demand is not active, as consumers are largely covered over the remainder of this year, and makers report buyers are specifying freely. Export demand is heavy. A local maker shipped two carloads of rivets to India last week. Prices, which are being shaded to some extent by jobbers, are as follows: Buttonhead structural rivets, ½ in. in diameter and larger, \$4 per 100 lb., base, and conehead boiler rivets, same sizes, \$4.10 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or one-half of 1 per cent for cash in 10 days.

Railroad Spikes and Track Bolts.—The new demand for railroad spikes is very dull and has been for some time. Some makers are operating to 50 per cent or less of capacity. The demand for track bolts is reported fairly active and prices are firm. We quote track bolts with square nuts at 4.50c. to 4.75c. to railroads and 5c. to 5.25c. in small lots to jobbers, base. Track bolts with hexagon nuts take the usual advance of 15c. per 100 lb. Prices on railroad spikes, which are only fairly strong, are as follows:

Standard railroad spikes, 4½ x 9/16 in. and larger, \$2.65 to \$2.75; railroad spikes, ½ and 7/16 in., \$2.75 base; railroad spikes, ¾ in. and 5/16 in., \$3.05 base; boat spikes, \$2.80 base, all per 100 lb., f.o.b. Pittsburgh.

Wire Products.—Mills report specifications against contracts for all kinds of wire and also for wire nails coming in freely, but the new demand for woven wire

fencing is dull, owing to the high prices ruling. Makers are not trying to push sales of fence wire, being perfectly satisfied to make the other grades for which there is a good demand and at high prices. Export demand for wire nails and barb wire is still heavy. Two local mills are now working on orders for about 50,000 tons of barb wire for shipment to Russia. It is stated that shipments of wire nails now going out are largely on the \$2.50 basis and that no new orders are being accepted at less than the \$2.60 price. Prices to the large trade are as follows: Wire nails, \$2.60, base, per keg; galvanized, 1 in. and longer, including large head barbed roofing nails, taking an advance over this price of \$2, and shorter than 1 in., \$2.50. Bright basic wire is \$2.65 per 100 lb.; annealed fence wire, 6 to 9, \$2.55; galvanized wire, \$3.25; galvanized barb wire and fence staples, \$3.45; painted barb wire, \$2.75; polished fence staples, \$2.75; cement-coated nails, \$2.50, base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven wire fencing remain at 61½ per cent off list for carload lots, 60½ per cent for 1000-rod lots and 59½ per cent for small lots, f.o.b. Pittsburgh.

Iron and Steel Bars.—Most of the business in iron and steel bars for the remainder of this year has been placed, and the mills also have large contracts on their books for delivery in first half of 1917. There is still a heavy export inquiry for steel rounds for shrapnel, but local mills are filled up so far ahead they are not keenly going after this business. We quote merchant steel bars at 2.60c. at mill, for delivery at convenience of the mill, which would be in last quarter of this year or first quarter of 1917; while for prompt shipment from warehouse, 3c. to 3.10c. is quoted. We quote refined iron bars at 2.60c. to 2.70c., and railroad test bars, 2.70c. to 2.80c. f.o.b. Pittsburgh.

Shafting.—Large consumers, such as automobile builders and the screw stock machine trade, are covering on their needs of shafting for first half of 1917 at about 20 per cent off list, and it is said a few contracts have been placed at 15 per cent off. We quote cold-rolled shafting at 20 to 15 per cent off in carload lots for delivery in last quarter of this year and first quarter of 1917, and 10 per cent off in less than carload lots, f.o.b. Pittsburgh, freight added to point of delivery.

Merchant Steel.—The new demand is still active, some large inquiries being in the market for delivery through the first half of 1917. Some mills are refusing to quote for delivery beyond this year, believing that later on they will be able to secure higher prices. Shipments are very heavy, and the mills are much behind in deliveries. We quote: Iron finished tire, ½ x ½ in. and larger, 2.60c., base; under ½ x ½ in., 2.75c.; planished tire, 2.75c.; smooth channel tire, ¾ to 1 in., 2.85c. to 2.90c.; 1½ in. and larger, 3.10c.; toe calk, 3.10c. to 3.15c., base; flat sleigh shoe, 2.75c.; concave and convex, 2.85c.; cutter shoes tapered or bent, 3.25c. to 3.35c.; spring steel, 3.25c. to 3.50c.; machinery steel, smooth finished, 2.90c. to 3c., all f.o.b. at mill.

Hoops and Bands.—Most consumers are covered over the remainder of this year, and some into the first quarter of 1917. New demand is light, but specifications against contracts are coming in freely. For current orders hoops are 3c. and steel bands 2.60c. at mill, with extras on the latter as per the steel bar card. For fairly prompt shipment steel bands are quoted at 2.75c. and higher.

Wrought Pipe.—Effective Thursday, Sept. 7, discounts on butt weld iron and steel pipe were lowered one point, an advance of \$2 per ton; lap weld black iron and steel pipe, two points, an advance of \$4 per ton, and oil country goods were advanced about \$4 per ton. The abnormally heavy demand and the very high prices ruling on steel are given as the principal reasons for this advance. No changes were made in galvanized pipe. On butt-weld sizes, the mills can make fairly prompt deliveries, but on lap-weld are sold up for five to six months ahead. The new discounts are given on another page.

Boiler Tubes.—Discounts on both iron and steel

tubes have been lowered two points, an advance of \$4 per ton. This was anticipated by the trade, and is due to the fact that the mills are sold up for six to eight months ahead, and also to the high prices ruling for steel. The new discounts are given on another page.

Coke.—High blast-furnace coke for prompt shipment continues scarce and is bringing \$2.90 to \$3 per ton. It is believed, however, that with the increased supply prices will be easier in the near future. We quote best grades of furnace coke on contracts at \$2.50 to \$2.60 per net ton at oven. It is a little early to talk of contracts for furnace coke for next year, but some makers say they will not sell at less than \$2.75, and their price may be higher when the time comes to make contracts. We quote best grades of 72-hr. foundry coke for spot shipment at \$3.25 to \$3.50, and on contracts, \$3.50 to \$3.75 per net ton at oven.

Old Material.—Reports that the leading local consumer would pay up to \$17 for selected heavy steel scrap are incorrect. This consumer bought some time ago about 80,000 tons of heavy steel scrap, but had an embargo on shipments until Sept. 1, when it was removed and it has since asked dealers from whom it bought to defer shipments as much as possible, as it was congested with scrap and having trouble in finding room to store it. None of the local consumers is buying scrap, except one interest which has lately taken probably 5000 tons or slightly more at about \$16.50, delivered, for selected grades. All other kinds of scrap are quiet, but prices are firm and there is an undertone of strength in the market which may result in higher prices in the near future. The recent large sales of steel discards, and the fact that basic iron is in heavy demand and likely to bring higher prices, are expected to improve the scrap market before long. Prices quoted by dealers for delivery in Pittsburgh and points that take the same rates of freight, per gross ton, are as follows:

Heavy steel melting scrap Steubenville, Follansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	\$16.00 to \$16.25
No. 1 foundry cast	14.50 to 14.75
Rerolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	16.50 to 17.00
Hydraulic compressed sheet scrap ..	13.50 to 14.00
Bundled sheet scrap, sides and ends, f.o.b. consumers' mills, Pittsburgh district	11.25 to 11.50
Bundled sheet stamping scrap	10.25 to 10.50
No. 1 railroad malleable stock	14.50 to 14.75
Railroad grate bars	10.25 to 10.50
Low phosphorus melting stock	19.75 to 20.00
Iron car axles	28.00 to 28.50
Steel car axles	28.00 to 28.50
Locomotive axles, steel	33.00 to 35.00
No. 1 busheling scrap	14.00 to 14.25
Machine-shop turnings	7.00 to 7.25
Old car wheels	13.25 to 13.50
Cast-iron borings	8.00 to 8.25
*Sheet bar crop ends	17.00 to 17.50
No. 1 railroad wrought scrap	18.00 to 18.75
Heavy steel axle turnings	10.50 to 10.75
Heavy breakable cast scrap	12.25 to 12.50

*Shipping point.

British Steel Market

Pig Iron Easier—American Billets in Strong Demand but Very High

(By Cable)

LONDON, ENGLAND, Sept. 13, 1916.

The Cleveland pig-iron position is somewhat easier and the needs of France are less urgent, with deliveries elsewhere freer. A few cargoes are going to Russia by way of Norway. American billets are in demand but transactions are hindered by the stiff terms, 3½-in. billets for September-October delivery being quoted at £14. Steel bars have sold at £16 10s. c.i.f. Liverpool for nearby arrival. Tin plates are dull, with government orders at 28s. and upward and stock plates at 36s. Ferrosilicon is quoted at £27. We quote as follows:

Tin plates, coke, 14 x 20, 112 sheets, 168 lb., f.o.b. Wales, 33s. to 35s.
Steel black sheets, No. 28, export, f.o.b. Liverpool, £20 5s.

Steel ship plates, Scotch, delivered local yards, £13 17s. 6d.
 Steel rails, export, f.o.b. works, £10 17s. 6d.
 Hematite pig iron, f.o.b. Tees, about 140s.
 Sheet bars (Welsh) delivered at works in Swansea Valley, £10 7s. 6d.
 Steel bars, export, f.o.b. Clyde, £18.
 Ferromanganese (nominal), £35.
 Ferrosilicon, 50 per cent, c.i.f., £27, against £29, last week.

Government Control Absolute—Stock Tin-Plate Business Active

LONDON, ENGLAND, Aug. 29, 1916—(By Mail).

The steel industry is absolutely under government control and ordinary merchant business has now become an utterly negligible quantity. There is an unceasing demand for various classes of material for the home trade or export, but it is practically impossible to get orders through for nearby delivery even for small lots. No relief is in sight because of the phenomenal pressure of war requirements, the inadequate output of crude iron, especially of hematite, and the further drain of men called up.

Cleveland foundry iron is unchanged, the undertone being strong, but with no stock at the furnaces business continues limited, the great bulk of the output being regularly absorbed by running contracts. Deliveries remain under close official control and business with neutrals is absolutely impossible. Preparations are being made for blowing in additional furnaces soon. The demand for hematite is as strong as ever and the booking of orders here is more particularly difficult, for the output is already earmarked for many months ahead. The increase of operations is difficult, chiefly owing to the dearth of labor.

In the manufacturing iron and steel sections, the congestion of orders for munition work is as intense as ever and deliveries are in arrears. Mild steel bars and steel hoops are practically unobtainable and bar iron for early delivery is extremely scarce.

The American semi-finished steel market is very bare, and much higher prices are now obtainable for the small quantities offering for nearby shipment. British consumers are badly in need of material and France is still inquiring for billets, but much longer terms of delivery are now required. For 3-in. material, Oct.-Dec., about \$75 c.i.f. is being asked. Sheet bars and wire rods are hard to get at any price.

Business in galvanized sheets for export has remained virtually at a standstill owing to the prohibition in force. Permits are difficult but the tone is firm.

A great deal of business has been done in tin plate at smartly advancing prices, the chief feature being the brisk demand for the home trade for stock plate, the supply of which is rapidly diminishing. The price of stock plate is expected to go to a considerable premium, there being no restriction on trading in this material. Quotations now range up to 35s—basis 20x14 f.o.b. It may be recalled that shipments were allowed to neutrals under license, but this has been stopped by the new regulation. This trade has been hard hit by the war, and it is now feared that the output may be cut down eventually to 30 to 35 per cent of the normal, owing to the steel famine.

German Pig Iron in July a War Record

Germany's July pig-iron output of 1,134,306 metric tons was the largest of the war, with a daily rate of 36,590 tons. The June output was 1,081,507 tons at 36,050 tons per day, the record till July. The output in July, 1915, was 1,064,899 tons, and in July, 1914, it was 1,564,345 tons. The July output this year was made up of 174,782 tons of foundry iron, 12,612 tons of Bessemer iron, 723,754 tons of basic iron, 206,183 tons of steel-making iron and spiegeleisen and 16,975 tons of forge iron.

The Anti-Blind Reflector Company, Johnstown, Pa., with a capital stock of \$10,000, has been formed by Fred G. Smith, 444 Franklin Street, Johnstown, William C. Miller and Rhea C. Smith, to manufacture automobile lamps, reflectors and accessories.

Iron and Industrial Stocks

NEW YORK, Sept. 13, 1916.

The phenomenal earnings of numerous industrial corporations have at last so impressed the public that a heavy general buying movement has made its appearance, carrying prices of many stocks to new records. United States Steel common has gone well over par for the first time in its history, while Republic Steel common, Lackawanna Steel, Midvale Steel and others have advanced with long strides. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week has been as follows:

Allis-Chal., com., 23 - 25 1/2	Ry. Steel Spring, com., 45 1/2 - 50 3/4
Allis-Chal., pref., 78 1/2 - 79 3/4	Republic, com., 55 - 67 1/2
Am. Can. com., 62 1/4 - 65 1/4	Republic, pref., 113 - 114 1/4
Am. Can. pref., 114 1/4 - 115	Sloss, com., 49 1/2 - 59 1/2
Am. Car & Fdy., com., 62 1/2 - 64 1/2	Sloss, pref., 96
Am. Car & Fdy., pref., 117 1/2 - 118 1/2	Pipe, com., 19 1/2 - 24 1/2
Am. Loco., com., 77 1/4 - 79 3/4	Pipe, pref., 52 1/2 - 53 1/2
Am. Loco., pref., 105 1/4 - 106 1/4	U. S. Steel, com., 99 1/4 - 105 3/4
Am. Steel Fdries., 54 1/2 - 58 3/4	U. S. Steel, pref., 118 1/4 - 119
Bald. Loco., com., 80 1/4 - 84 1/2	Va. I. C. & Coke, 45 - 56
Bald. Loco., pref., 104 - 106 1/2	Westing. Elec., 59 1/2 - 63 3/4
Beth. Steel, com., 490 - 524 1/2	Am. Rad., com., 396 - 399
Beth. Steel, pref., 136 - 138	Am. Rad., pref., 134
Colorado Fuel, 49 - 53 3/4	Am. Ship, com., 46 - 49
Deere & Co., pref., 90	Am. Ship, pref., 94
Gen. Electric, 170 3/4 - 173 1/2	Chic. Pneu. Tool, 72 1/2 - 74 1/2
Gt. No. Ore Cert., 38 3/4 - 43 3/4	Lake Sup. Corp., 10 1/2 - 11 1/2
Int. Harv. of N. J., com., 115 - 117	Warwick, 9 1/2
Int. Harv. Corp., com., 78 - 79	Cruc. Steel, com., 78 1/4 - 85 3/4
Int. Harv. Corp., pref., 108 3/4	Cruc. Steel, pref., 118 - 119
Lacka. Steel, 78 1/2 - 84 3/4	Harb.-Walk. Refrac., com., 102 - 102 1/2
Nat. En. & Stm., com., 24 3/4 - 27 1/2	Harb.-Walk. Refrac., pref., 105
Nat. En. & Stm., pref., 95	La Belle Iron, com., 57 - 59 1/2
N. Y. Air Brake, 136 1/2 - 139	La Belle Iron, pref., 133 1/2 - 134
Pitts. Steel, pref., 98 - 99	Carbon Steel, 1st pref., 78 - 80
Pressed Stl., com., 54 1/2 - 59 1/2	Dom. Steel, com., 59
Pressed Stl., pref., 100	Dom. Steel, pref., 58 3/4
	Driggs-Seabury, 75 - 88
	Midvale Steel, 62 1/2 - 69 3/4

Dividends

The Safety Car Heating & Lighting Company, regular quarterly, 2 per cent, payable Oct. 2.

The Allis-Chalmers Mfg. Company, regular quarterly, 1 1/2 per cent on the preferred stock, payable Oct. 16.

The Electric Storage Battery Company, regular quarterly, 1 per cent on the preferred and common stock, payable Oct. 2.

The Baltimore Tube Company, regular quarterly, 1 1/2 per cent on the preferred and common stocks, payable Oct. 1.

The Paige-Detroit Motor Car Company, stock dividend of 50 per cent. Last May the directors of the company declared a stock dividend of 80 per cent, and in July, 1915, a stock dividend of 100 per cent was distributed.

The Canadian General Electric Company, regular quarterly, 1 1/2 per cent on the common stock, payable Oct. 1.

The J. I. Case Threshing Machine Company, regular quarterly, 1 1/2 per cent on the preferred stock, payable Oct. 2.

The Sloss-Sheffield Steel & Iron Company, regular quarterly, 1 1/2 per cent on the preferred stock, payable Oct. 2.

New Structural Shop at Washington

Barber & Ross, Washington, D. C., are erecting for their own use a structural-steel fabricating shop, with electric crane yard equipment. The shop will be 80 x 300 ft., of steel-frame construction, with slag roof and corrugated sides, and equipped with overhead cranes. The storage-yard crane will have a span of 72 ft. and a runway of 380 ft., to handle standard and Bethlehem shapes, of which a stock of approximately 2000 tons is carried. The company will fabricate for local delivery and for shipment throughout the South. It has 10 acres of land adjoining its present plant and siding facilities on the Baltimore & Ohio Railroad.

Duplex Process Started at Donora

The duplex process of making steel was started last week by the American Steel & Wire Company at its Donora, Pa., works. A 1300-ton metal mixer was built and installed in the plant by the Pennsylvania Engineering Works, New Castle, Pa., also two 25-ton Bessemer converters, a four-hole soaking pit and there are also 11 60-ton open-hearth and two 60-ton acid furnaces. The introduction of the duplex process is expected to increase the output of the steel works from 20 to 25 per cent.

Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, effective from April 10, 1916, per 100 lb.: New York, 16.9c.; Philadelphia, 15.9c.; Boston, 18.9c.; Buffalo, 11.6c.; Cleveland, 10.5c.; Cincinnati, 15.8c.; Indianapolis, 17.9c.; Chicago, 18.9c.; St. Louis, 23.6c.; Kansas City, 43.6c.; Omaha, 43.6c.; St. Paul, 32.9c.; Denver, 68.6c.; New Orleans, 30.7c.; Birmingham, Ala., 45c.; Pacific coast (by rail only), 65c.

Structural Material.—I-beams, 3 to 16 in.; channels, 3 to 15 in.; angles, 3 to 6 in. on one or both legs, ¼ in. thick and over, and zees 3 in. and over, 2.60c. to 2.75c. Extras on other shapes and sizes are as follows:

	Cents per lb.
I-beams over 15 in.	.10
H-beams over 18 in.	.10
Angles over 6 in., on one or both legs	.10
Angle, 3 in. on one or both legs less than ¼ in. thick, as per steel bar card, Sept. 1, 1909	.70
Tees, structural sizes (except elevator, handrail, car truck and conductor rail)	.05
Channels and tees, under 3 in. wide, as per steel bar card, Sept. 1, 1909	.20 to .80
Deck beams and bulb angles	.30
Handrail tees	.75
Cutting to lengths, under 3 ft. to 2 ft. inclusive	.25
Cutting to lengths, under 2 ft. to 1 ft. inclusive	.50
Cutting to lengths, under 1 ft.	1.55
No charge for cutting to lengths 3 ft. and over.	

Plates.—Tank plates, ¼ in. thick, 6 in. up to 100 in. wide, 3c. to 4c., base, net cash, 30 days, or ½ of 1 per cent discount in 10 days, carload lots. Extras are:

	Cents per lb.
Tank steel	Base
Pressing steel (not flange steel for boilers)	.10
Boiler and flange steel plates	.15
"A. B. M. A." and ordinary firebox steel plates	.20
Still bottom steel	.30
Locomotive firebox steel	.50
Marine steel, special extras and prices on application.	

Quality Extras

	Cents per lb.
Rectangular, 1½ in. thick, over 6 in. wide to 100 in. wide. Base	
Lighter than ¼ in., to 3/16 in., up to 72 in. wide	.10
*Lighter than ¼ in., including 3/16 in., over 72 in. to 84	.20
*Lighter than ¼ in., including 3/16 in., over 84 in. to 96	.30
*Lighter than ¼ in., including 3/16 in., over 96 in. to 100	.40
*Lighter than ¼ in., including 3/16 in., over 100 in. to 102	.45
Lighter than 3/16 in., including No. 8, up to 72 in. wide	.15
*Lighter than 3/16 in., including No. 8, over 72 in. to 84	.25
*Lighter than 3/16 in., including No. 8, over 84 in. to 96	.35
Lighter than No. 8, including No. 10, up to 60 in. wide	.30
Lighter than No. 8, including No. 10, over 60 in. to 64	.35
Up to 72 in. not less than 10.2 lb. per sq. ft. will be considered ¼ in.	
Over 72 in. must be ordered ¼ in. thick on edge, or not less than 11 lb. per sq. ft. to take base price.	
Over 72 in. wide, ordered less than 11 lb. per sq. ft., down to weight of 3/16 in., take price of 3/16 in.	
Over 72 in., ordered weight 3/16 in., take No. 8 price.	
Over 72 in., ordered weight No. 8, take No. 10 price.	

Width Extras

	Cents per lb.
Over 100 in. to 110 in. inclusive	.05
Over 110 in. to 115 in. inclusive	.10
Over 115 in. to 120 in. inclusive	.15
Over 120 in. to 125 in. inclusive	.25
Over 125 in. to 130 in. inclusive	.50
Over 130 in.	1.00

Length Extras

	Cents per lb.
Universal plates 80 ft. long up to 90 ft. long	.05
Universal plates 90 ft. long up to 100 ft. long	.10
Universal plates 100 ft. long up to 110 ft. long	.20

Cutting Extras

	Cents per lb.
No charge for rectangular plates to lengths 3 ft. and over	
Lengths under 3 ft. to 2 ft. inclusive	.25
Lengths under 2 ft. to 1 ft. inclusive	.50
Lengths under 1 ft.	1.55
Circles 3 ft. in diameter to 100 in.	.30
Circles over 100 to 110 in. (width extra)	.35
Circles over 110 to 115 in. (width extra)	.40
Circles over 115 to 120 in. (width extra)	.45
Circles over 120 to 125 in. (width extra)	.55
Circles over 125 to 130 in. (width extra)	.80
Circles over 130 in. (width extra)	1.30
Circles under 3 ft. to 2 ft. inclusive	.55
Circles under 2 ft. to 1 ft. inclusive	.80
Circles under 1 ft.	1.85
Half circles take circle extras.	
Sketches, not over four straight cuts, inc. straight taper	.10
Sketches having more than four straight cuts	.20
Plates sheared to a radius take complete circle extras.	

*Including extra for width.

Wire Rods.—Including chain rods, \$55 to \$60.

Wire Products.—Prices to jobbers effective Aug. 5: Fence wire, Nos. 6 to 9, per 100 lb., terms 60 days or 2 per cent discount in 10 days, carload lots, annealed, \$2.55; galvanized, \$3.25. Galvanized barb wire and staples, \$3.45; painted, \$2.75. Wire nails, \$2.60. Galvanized nails, 1 in. and longer, \$2 advance over base price; shorter than 1 in., \$2.50 advance over base price. Cement-coated nails, \$2.50. Woven wire fencing, 61½ per cent off list for carloads, 60½ off for 1000-rod lots, 59½ off for less than 1000-rod lots.

The following table gives the price per 100 lb. to retail merchants on fence wire in less than carloads, with the extras added to the base price:

	Plain Wire, per 100 lb.							
Nos.	6 to 9	10	11	12	12½	13	14	15
Annealed	\$2.60	\$2.65	\$2.70	\$2.75	\$2.85	\$2.95	\$3.05	\$3.15
Galvanized	3.30	3.35	3.40	3.45	3.55	3.65	4.10	4.20

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card in effect on black pipe from Sept. 7, 1916, and on galvanized pipe from July 24, 1916, all full weight:

Butt Weld			
Steel		Iron	
Inches	Black Galv.	Inches	Black Galv.
1½, 1¼ and ¾	62	1½ and ¾	51
¾	66	¾	52
¾ to 3	69	¾ to 1½	56
			59
Lap Weld			
2	63	1½	46
2½ to 6	66	1½	52
7 to 12	63	2	53
13 and 14	63½	2½ to 4	55
15	51	4½ to 6	55
		7 to 12	54
Reamed and Drifted			
1 to 3, butt	67	¾ to 1½, butt	54
2, lap	61	1½, lap	41
2½ to 6, lap	64	1½, lap	47
		2, lap	48
		2½ to 4, lap	51

Butt Weld, extra strong plain ends

1½, 1¼ and ¾	58	1½, 1¼ and ¾	51
¾	63	¾	56
¾ to 1½	67	¾ to 1½	60
2 to 3	68		

Lap Weld, extra strong, plain ends

2	61	1½	48
2½ to 4	64	1½	53
4½ to 6	63	2	55
7 to 8	59	2½ to 4	57
9 to 12	54	4½ to 6	56
		7 to 8	50
		9 to 12	45

Butt Weld, double extra strong, plain ends

1½	54	1½	43
¾ to 1½	57	¾ to 1½	46
2 to 2½	59		

Lap Weld, double extra strong, plain ends

2	53	1½	42
2½ to 4	55	1½	42
4½ to 6	54	2	44
7 to 8	49	2½ to 4	43
		4½ to 6	43

To the large jobbing trade an additional 5 per cent is allowed over the above discounts.

The above discounts are subject to the usual variation in weight of 5 per cent. Prices for less than carloads are two (2) points lower basing (higher price) than the above discounts on black and three (3) points on galvanized.

Boiler Tubes.—Discounts on less than carloads, freight to destination added, effective from Sept. 7, 1916, are as follows:

Lap Welded Steel	Standard Charcoal Iron
1½ in.	1½ in.
1½ and 2 in.	1½ and 2 in.
2½ in.	2½ in.
2½ and 3 in.	2½ and 3 in.
3 and 3½ in.	3 and 3½ in.
3½ to 4½ in.	3½ to 4½ in.
5 and 6 in.	5 and 6 in.
7 to 13 in.	7 to 13 in.

Locomotive and steamship special charcoal grades bring higher prices.

1½ in., over 18 ft., and not exceeding 22 ft., 10 per cent net extra.

2 in. and larger, over 22 ft., 10 per cent net extra.

Sheets.—Makers' prices for mill shipments on sheets of U. S. standard gage, in carload and larger lots, are as follows, 30 days net, or 2 per cent discount in 10 days:

Blue Annealed Sheets		Cents per lb.
Nos. 3 to 8		2.85 to 2.95
Nos. 9 and 10		2.90 to 3.00
Nos. 11 and 12		2.95 to 3.05
Nos. 13 and 14		3.00 to 3.10
Nos. 15 and 16		3.10 to 3.20
Box Annealed Sheets, Cold Rolled		Cents per lb.
Nos. 17 to 21		2.70 to 2.80
Nos. 22 and 24		2.75 to 2.85
Nos. 25 and 26		2.80 to 2.90
No. 27		2.85 to 2.95
No. 28		2.90 to 3.00
No. 29		2.95 to 3.05
No. 30		3.15 to 3.25
Galvanized Sheets of Black Sheet Gage		Cents per lb.
Nos. 10 and 11		3.15 to 3.25
No. 12		3.25 to 3.35
Nos. 13 and 14		3.25 to 3.35
Nos. 15 and 16		3.40 to 3.50
Nos. 17 to 21		3.55 to 3.65
Nos. 22 and 24		3.70 to 3.80
Nos. 25 and 26		3.85 to 3.95
No. 27		4.00 to 4.10
No. 28		4.15 to 4.25
No. 29		4.30 to 4.40
No. 30		4.55 to 4.65

Metal Markets

The Week's Prices

		Cents Per Pound for Early Delivery					
		Copper, New York	Tin, Electrolytic	New York	Lead, New York	St. Louis	Spelter, New York
Sept.	Lake						
6	28.00	28.00	38.87½	6.75	6.60	8.75	8.50
7	28.00	28.00	38.87½	6.75	6.60	8.75	8.50
8	28.00	28.00	38.50	6.75	6.60	8.87½	8.62½
9	28.00	28.00	.....	6.70	6.55	9.00	8.75
11	28.00	28.00	38.37½	6.70	6.55	9.12½	8.87½
12	28.00	28.12½	38.25	6.75	6.60	9.25	9.00

NEW YORK, Sept. 13, 1916.

Copper is strong and some heavy buying has been quietly done. Tin is quiet and easier. Prompt lead commands a premium. Activity in spelter has stiffened the market. Antimony is dull and lower.

New York

Copper.—Buying on the part of the allied governments, and by domestic consumers for fourth quarter delivery, has stiffened the market. Prompt metal is very scarce, and for that delivery resellers are asking from 28.12½c. to 28.25c. The producers are well sold up so far as the earlier positions go, and several are not quoting prompt or nearby. For October they ask 28c., and 27c. for first quarter. Lake is about 27.75c., December shipment, with little to be had this side of that month. Late last week the Russian Ministry of Munitions purchased 5000 tons, and it is declared the metal has sold on Russian account, October delivery, at 28.50c. The allied governments have inquired for 125,000 tons, action on which is yet pending. Delivery on this large quantity is to be in 1917. It is understood that negotiations were halted by the price question, Great Britain not being willing to pay over 26c. Electrolytic at London was quoted yesterday at £132, against £130 a week previous. The exports this month, including yesterday, total 10,472 tons. The mills making finished brass and copper products are busier than ever, partly because of new contracts placed for rods and sheet brass. One large mill is quoting brass rods at 39c., although 34c. can be done in other directions. Two or three large mills have all they can do this year. Brass wire is difficult to obtain.

Tin.—For the most part the market has been dull and the quotation for spot Straits is a little lower at 38.25c. Resale Banca has continued a factor. While it is believed that the supply is nearing its end, a little is moving every day. Late last week offerings of 37.50c., January and February delivery, failed to elicit orders. On Monday of this week the market was almost at a standstill and offerings of tin soon to arrive at 38c. induced but little business. Yesterday there was inquiry for about 100 tons of futures, and fair inquiry also for Banca, but actual sales were few. Consumers are well covered, many of them with tin for which they paid more than the present market. Arrivals this month total 865 tons, and there is afloat 3980 tons.

Lead.—In the past week the market has appeared quiet on the surface, but it has leaked out that some fair purchases have been made, mostly for prompt and early shipment. There have been some good inquiries from abroad. The independent producers are asking and getting premiums over the prices of the leading interest, which are nominal at 6.50c., New York, and 6.42½c., St. Louis. For prompt metal 6.75c. is quoted, and in a special transaction 6.87½c., Philadelphia, was paid. The leading interest has been restricting its sales to regular customers, sometimes refusing to take business at all. Yesterday's quotation at St. Louis was 6.60c.

Spelter.—Extensive foreign inquiries and good buying by domestic brass mills have imparted a decidedly better tone to the market. Spot has advanced to 9.25c., New York, and 9c., St. Louis. The bulk of the business was for forward deliveries. Sales for October delivery have been made at 9c., New York. Last quarter is quoted at 8.75c. to 8.87½c., New York. Canadian

interests are in the market for 500,000 lb., action on which is pending. Nearby metal is scarce, not so much because of a shortage as because of the unwillingness of the producers to let out too much metal.

Antimony.—Purchases have been made at 11c., duty paid, but there is very little doing. Chinese producers are refusing to accept present prices, preferring to hold for higher figures.

Aluminum.—No. 1 virgin aluminum, 98 to 99 per cent pure, is unchanged at 60c. to 62c. per lb.

Old Metals.—The market is strong, with an active demand. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible	25.00 to 25.50
Copper, heavy and wire	23.75 to 24.75
Copper, light and bottoms	21.00 to 22.00
Brass, heavy	14.00 to 15.00
Brass, light	11.50 to 12.00
Heavy machine composition	19.00 to 20.00
No. 1 yellow rod brass turnings	14.50 to 15.00
No. 1 red brass or composition turnings	15.50 to 16.50
Lead, heavy	6.25
Lead, tea	5.75
Zinc	7.00 to 7.50

Chicago

SEPT. 11.—The metal market of the past week has not been active and price changes have been of minor importance. Reports indicate a tendency to concessions from copper and lead quotations in this market. We quote: Casting copper, 26c.; Lake copper, 27.75c.; tin, carloads, 39c., and small lots, 41c.; lead, 6.55c. to 6.60c.; spelter, 9c.; sheet zinc, 15c.; Cookson's antimony, 50c.; other grades, 14c. On old metals we quote buying prices for less than carload lots as follows: Copper wire, crucible shapes, 19.50c.; copper bottoms, 17.75c.; copper clips, 18.50c.; red brass, 17c.; yellow brass, 13c.; lead pipe, 5.25c.; zinc, 6c.; pewter, No. 1, 28c.; tinfoil, 33c.; block tin pipe, 37c.

St. Louis

SEPT. 11.—Non-ferrous metals have been sluggish, closing to-day as follows: Lead, 6.62½c. to 6.75c.; spelter, 8.62½c. to 8.75c.; tin, 38.75c. to 38c.; Lake copper, 28.50c.; electrolytic copper, 28c.; antimony, Asiatic, 12c. In the Joplin ore market, weakness continued, with the top price for zinc blende, \$65, while the range was down as low as \$40. The average for the week was \$51. Calamine ranged from \$35 to \$45, with the average for the week about \$40. Lead ore was steady at \$65 for 80 per cent. On miscellaneous scrap metals we quote dealers' buying prices as follows: Light brass, 8c. to 8.50c.; heavy yellow brass, 11.50c.; heavy red brass and light copper, 14.50c.; heavy copper and copper wire, 17c. to 18c.; zinc, 5½c. to 6c.; lead, 4½c. to 5c.; pewter, 24c.; tinfoil, 31c.; tea lead, 3½c.

India's Pig-Iron and Steel Output in 1915

India's production of pig iron in 1915, according to recent data of the British Iron and Steel and Allied Trades Federation, was 270,027 gross tons, as compared with 234,726 tons in 1914. The output of steel ingots was 103,474 tons, against 66,603 tons in 1914. The finished steel production was 68,634 tons, made up of 15,780 tons of heavy rails, 953 tons of light rails, 432 tons of sleepers and fish plates, 28,481 tons of joists and girders, 5881 tons of angles, tees and channels and 17,107 tons unenumerated.

Japan's Iron-Ore Supply

Japan's iron-ore resources are estimated at 80,000,000 tons from its island possessions alone, according to a recent investigation by the Department of Agriculture and Commerce. The deposit of magnetic ore at Kamaishi is placed at 35,000,000 tons, with 5,000,000 to 6,000,000 tons of such ore from other mines in eight provinces. Red iron-ore deposits in six provinces are figured at 30,000,000 tons and deposits of brown ore in other localities at 10,000,000 tons.

The McLean Construction Company, with a capital stock of \$25,000, has been incorporated by L. O. McLean, 829 Oliver Building, Pittsburgh, Richard Townsend and Tony De Donne, to engage in general construction work.

The Electric Furnace in Steel-Making

A Symposium on the Advantages
and Practical Results Already De-
rived from Three Operating Units

IN the symposium on "Electric Furnace Practice," which was the leading feature of the steel session of the American Foundrymen's Convention on Thursday morning, Sept. 14, a number of important papers were offered representing several of the leading electric furnaces now in operation in this country. Records of the operations

of the Heroult, Synder and Grönwall-Dixon furnaces were presented by men familiar with their actual exploits. Abstracts of the papers are here given with the exception of the one on the Grönwall-Dixon furnace, a special article descriptive of this having appeared in THE IRON AGE, Sept. 7, 1916.

Electric Furnace Practice in Making Steel Castings

BY T. S. QUINN*

THE ever increasing demand for a higher grade of small steel castings, influenced the Lebanon Steel Foundry, Lebanon, Pa., to consider the electric furnace to supplant the crucible furnaces, which up to that time constituted the melting equipment. Having decided on a basic furnace as being the most economical from a standpoint of the local scrap market, the Heroult furnace, of 1-ton capacity, was installed in March, 1915. It was provided with Thury regulators, steel non-water cooled holders, and Gray tilting device, and is of the three-phase type. The bottom and side walls are magnesite up to the slag line, and the side walls and roof are silica brick.

Three weeks after the first heat was poured the stack of the crucible furnaces was thrown, and the furnaces themselves were dismantled. This provided space for another electric furnace, should the normal expansion of business warrant it. In July, 1916, a second unit was installed of the same type, but of 2 tons capacity, and proportionately higher powered. The 1-ton furnace has a transformer capacity of only 225 kva.; the 2-ton size has 600 kva. capacity.

The product of both furnaces is small steel castings, averaging 5 to 10 lb. in weight. The castings are made for automobile, motor truck and general machinery purposes.

DATA OF THE ONE-TON FURNACE

I do not feel warranted at this time in making any statements in reference to the 2-ton furnace, as the length of time that it has been in operation is too short from which to draw intelligent conclusions. Up to Aug. 1, 1916, the 1-ton furnace made more than 2000 heats on the original basic bottom. In that time it has not been out of service except for relining, which it was customary to do on a Saturday or Sunday. The magnesite bottom, which was set in layers of 1 in. to 1½ in., is still in the furnace. In setting a bottom in this fashion a monolithic mass is obtained that cannot be equalled by a bottom rammed in with magnesite, tar and pitch. The life of a lining varies from 100 to 125 heats, and the life of a roof from 125 to 150 heats.

Amorphous-carbon electrodes are used, the consumption averaging about 25 lb. per net ton of steel in the ladle. This low electrode consumption for a small furnace of the three-phase type probably is due to the fact that shortly after the furnace went into operation, the solid copper type electrode holders were abandoned, and low carbon steel holders substituted. Each holder has two hinges, and the bus-bars are continued on out past each hinge, to prevent any heating at this point. The advantages of this holder include the absence of any water cooling and freedom from breakage, due to torsional stresses. The ease with which an electrode can be slipped also is a decided advantage.

The operation of the furnace for the past year has

been on a 24-hr. schedule, and while lack of transformer capacity was a serious handicap to maximum production, the furnace made an average of six to seven heats in 24 hr. A 1-ton furnace built to-day would have more transformer capacity, and with say 450 kva. as many heats could undoubtedly be made in 12 hr., at the same time effecting economy in power consumption.

POWER CONSUMPTION MODERATE

Actually, the power consumption has averaged 950 kw.-hr. per net ton of steel in the ladle, which is about what might be expected of a 1-ton furnace with insufficient power back of it. Even in the short length of time in which the 2-ton furnace has been in operation, it has been demonstrated satisfactorily that steel can be put into the ladle at the same temperature for the same purpose, with a kilowatt-hour consumption not exceeding 750 per net ton, and undoubtedly the power consumption on 3-ton and 6-ton furnaces is considerably less than this. Every effort is made to minimize the length of time between heats, and it not infrequently happens that bottom is made, and the charge is in the furnace, and the current on by the time the previous heat is poured, a matter of some 8 or 10 min.

The practice on this furnace has been to patch the banks with dolomite as soon as the heat is out of the furnace, and the charge is then introduced, consisting generally of what is known as heavy melting steel scrap. This scrap may have practically any analysis, as long as it is of chargeable size, and the carbon not too high. Coke is next placed under the electrodes on top of the scrap. Then the electrodes are lowered and the current turned on to the full capacity of the transformers in summer time, although in winter the furnace is often operated with a constant overload on the transformers of 25 per cent.

DETAILS OF THE PRACTICE

In about 20 min. a puddle of molten metal is formed under each electrode, and the surges of current become violent as the electrodes arc on the metal. Lime is now added with spar and sand, and the furnace again settles down and works steadily, and in about 1½ hr. the charge is completely melted, at which stage of the operation the phosphorus has gone into the slag, where it is retained as phosphate of lime. Generally this reaction is sufficiently complete without the aid of any oxidizing agent other than the rust that is on most scrap. At this juncture the melter pours a test bar, breaks it, and by examination ascertains whether his carbon is high or low, and either ores down or pigs up, until this element is in order. If much ore is required of course more lime must be added to maintain sufficient basicity in the slag to take care of the phosphorus.

The furnace is tilted slightly and the slag is pulled off by means of a rake, an operation that takes, in skilled hands, about 3 min. The furnace is put back

*Secretary-treasurer, Lebanon Steel Foundry, Lebanon, Pa.

into place, and the second slag is made with lime, spar and sand, and at this stage of the heat the deoxidizing and desulphurizing period begins. As soon as the slag is melted, and is of the proper consistency, powdered coke is added, and in about 20 min. under the intense heat of the arcs, the slag becomes reduced, calcium carbide forms, and the sulphur goes into the slag, where it is retained as calcium sulphide. This reaction is very complete. However, the mere fact that a calcium carbide slag has been formed is no indication that the steel under it is thoroughly deoxidized, and it is necessary to hold the metal under this slag at least 20 to 30 min. to completely kill it. Manganese and silicon are next added, and the atmosphere of the furnace, and the condition of the slag at this stage of the heat is such that if for any reason it should be desirable to do so, the heat could be held in the furnace for an indefinite length of time without any appreciable loss in the manganese or silicon content in the steel, providing the slag is carefully watched and protected from any possible oxidation from the doors, etc.

To be able to introduce into a furnace a given amount of manganese, silicon, chrome, vanadium, etc., and hold it in the metal for an indefinite period, theoretically getting in the steel just what was introduced, is proof of the almost perfect deoxidizing possibilities of the electric furnace and of the condition of the steel as it comes from the furnace, the advantages of which must be apparent to operators of converter and open hearth, who are obliged to finish their metal in the ladle, resulting in an inferior product.

THE USE OF ALUMINUM

Were the whole heat to be put into a big ladle, and bottom-poured direct into the molds, there would be no necessity for the use of any aluminum, but as the practice necessitates the pouring of the metal from the furnace into a big ladle, and again pouring it into shanks, and from the shanks into the molds, it must be plain that this practice is very severe on the metal. No matter how thoroughly the steel might be deoxidized in the furnace, the tendency of the metal when it is handled so many times, and at a temperature sufficiently high to pour very light work, is to absorb some oxygen, and a small addition of aluminum is made in each shank as a preventative rather than a cure. There have been periods, however, when no aluminum was added even in the shanks for weeks at a time, but this practice taxes the skill of the melters to the utmost and is not to be recommended, when shanking steel in small quantities at high temperatures.

The finishing of a heat in the electric furnace re-

quires very nice judgment on the part of the operator, and as the process is comparatively a new one, a scarcity of experienced melters is probably often the cause of much steel being put out in the market as "Electric Steel" which is not worthy of the name.

THE PROPERTIES AND COST OF THE STEEL

Too much cannot be said of the physical properties of electric steel, when properly made. With a view of ascertaining what electric steel would pull in comparison with steel from the converter, and open hearth, some 20 test bars were taken from as many consecutive heats. The chemical and physical properties were as follows:

	Per Cent
Carbon	0.23
Silicon	0.29
Manganese	0.62
Phosphorus	0.018
Sulphur	0.028
Ultimate tensile strength, lb. per sq. in.	71,417
Elastic limit, lb. per sq. in.	43,417
Elongation, per cent in 2 in.	31.60
Reduction of area, per cent.	51.00

It will be noted that the average elastic ratio was 61 per cent of the ultimate tensile strength. The only heat treatment that the test bars received was a slow anneal at about 1600 deg. Fahr. Of the same analysis and with the same simple heat treatment, no tests from the converter, or open-hearth have come to the author's attention approaching these figures.

Information on the cost of steel in the ladle for casting purposes, governed as it is by local conditions, is of little use for purposes of comparison, unless all the variable factors entering into it are known. Therefore, the author refrains from touching on this phase of the manufacture of steel in the electric furnace.

However, the fact that there are in this country over 100 electric furnaces in operation is sufficient evidence that the electric furnace is commercially able to make its way.

To-day the development of the furnace is hampered, if not threatened, by instances of dissatisfaction with the product, probably because it is the trend of the times to commercialize any important discovery on a large scale, and it is possible that the exploitation and installation of electric furnaces has been so rapid that the development of metallurgical and operative skill has not been in proportion. Certainly the electric furnace does not call for any better operative talent than the open-hearth, and it is only reasonable to assume that when electric furnace practice is established and standardized as has been the case with the open-hearth, it will come into its own.

The Electric Furnace in the Foundry

BY EUGENE B. CLARK*

THE principal advantage of the electric furnace method of steel production is the high quality of the steel which it is possible to produce. Thorough refinement is possible. The cost of installation is high per ton of daily output. The cost of operation under average conditions approximates closely to the cost of operating the open-hearth or the converter. If favorable operating costs are to be obtained, the electric furnace is less flexible than the converter. It should be operated continuously in order to secure low costs, and continuous operation of the electric furnace may not fit in nicely with the requirements of the foundry.

Notwithstanding these disadvantages, the use of the electric furnace has grown rapidly in recent years, due partly to the demand for a high grade of metal and partly to the desire on the part of foundries whose business is increasing to try out the electric furnace. Probably the principal reason for the rapid increase in the number of electric furnace installations, however, is the enthusiastic activity of men engaged in their development and sale and the desire of the progressive foundryman to be as well equipped as his competitor.

One furnace installation has led to others in many cases. This may seem like robbing the electric furnace of the credit for developing on its own merit, though it is not so intended. I wish to be clearly understood as not speaking in a manner at all derogatory to the electric furnace, and yet I feel that so much enthusiasm has been displayed in presenting its advantages that a word of conservatism and caution will not be out of place.

DISADVANTAGES OF THE ELECTRIC FURNACE

A belief hastily arrived at that the electric furnace is a cure for all the evils and troubles in the foundry will inevitably lead to disappointment. The electric furnace has some marked advantages, and it also has some annoying disadvantages. A foundryman contemplating the installation of such a furnace should clearly understand both. If he wants to produce an extremely high grade of molten metal and has a market for a product which will require this highly refined steel, then he has a very strong argument for the installation of an electric furnace. Many electric furnaces have been installed, however, where such conditions have not existed. It should be understood that all the metal

*President, Buchanan Electric Steel Company, Buchanan, Mich.

which goes through an electric furnace is not necessarily of a high grade. While it is possible to produce such metal, it is by no means true that the furnace itself will produce it unless it be operated properly.

The average steel foundry in the past has not been equipped and organized to produce highly satisfactory results from a metallurgical standpoint. The foundryman uses steel merely as an incident in his business. The older methods of producing steel have been to a large extent "rule of thumb." The operation of an electric furnace can be reduced to routine practice with satisfactory results, but this will not be accomplished without the serious effort of a skilled metallurgical management. It is not possible for the average foundry to buy an electric furnace, set it up and start it, like a molding machine. Steel making has its annoyances, no matter what method may be used, and it should be realized clearly that the finer the apparatus, the more skillfully must it be operated to attain to excellency of results. It is something like photography. Almost anyone can obtain pretty fair results with an ordinary camera. An unusually fine camera will permit of much better results, but the camera itself is only the tool. The photographer must be highly skilled to get the best results out of the finest camera.

The very fact that an intending user of an electric furnace will be confronted right at the start with an embarrassing number of different types of furnaces which he may install, each one of which goes by the name of the man who was interested in its development, is evidence of the great variety of ideas and opinions of different men as to what style and type of electric furnace is best. The intending purchaser must decide between not only an arc or an induction furnace, and between various types of each, but, having decided on the general type, he then is confronted by the necessity of selecting a Heroult, a Stassano, a Girod, a Snyder, a Grönwall-Dixon, a Rodenhauser, a Rennerfelt, or one of a number of others. Such a list certainly is confusing. They cannot all be the best, and the thinking man quickly reaches the conclusion that where there are so many differences of opinion there must be many knotty problems.

MELTING OPERATION IS PRELIMINARY

If the true advantage of the electric furnace is to be realized, the melting operation is merely the preliminary one. After that a metallurgical treatment of the molten bath is to be accomplished. This is done by the proper manipulation of slags. It is at this point that skill and metallurgical knowledge is necessary. Inasmuch as high-grade steels must be lower in phosphorus and sulphur than the average scrap available for charging, it is necessary, generally speaking, to build the electric furnace with a basic lining. The heat supplied electrically is in such intense and concen-

trated form and the restricted size of the furnace brings the walls in such close proximity to the arc that delicate regulation is necessary to introduce the heat into the metal without at the same time scorifying the roof, walls and banks of the furnace. This situation is further complicated by the fact that the highly basic slag required for proper refinement is such a poor conductor of heat. Also, when the furnace lining is attacked the composition of the slag is immediately altered and the metallurgical reactions seriously interrupted. When the proper reducing conditions are obtained during the refining period, the copious white fumes which fill the furnace make it difficult for the melter to watch the brickwork and to know when a fluxing temperature has been reached.

The absence of a flame, with attendant excess of air, in the electric furnace, while making possible the attainment of conditions peculiar to electric refining, and while in many ways a highly desirable feature, will not of itself insure deoxidized metal. The bath in an electric furnace is as much oxidized as any open-hearth heat—in fact, dephosphorization absolutely requires an over-oxidized bath. Successful refining, to be thoroughly done, requires the complete removal of the first slag and the making of a second slag under the action of which the metal is to be thoroughly deoxidized and desulphurized. The proper manipulation of these slags must be in the hands of a man who knows what he wants to do and how to do it. In other words, he must have metallurgical knowledge. The chemical reactions are simple and easily understood, but they are accomplished under conditions which are not easily controllable except under the guidance of skilled operators.

THE QUESTION OF COST

Finally, the question of cost must always be borne in mind. It is easy to destroy or seriously damage the lining of a furnace in the efforts to control a refractory heat and bring it out of the furnace as high-grade steel. At best, the life of roof and walls is short, compared to that of the open-hearth, and the small tonnage produced necessarily means high repair cost per ton of steel. In unskilled hands, the electric furnace is likely to prove a source of disappointment in its performance, but when perfection of practice is reached the electric furnace will produce metal of the highest quality. If such a grade of steel is required, and if it can be used profitably, the electric furnace will amply repay its difficulties of operation. I have no hesitation in saying that if a foundryman requires a better steel than can be produced readily by other processes, and if he is willing to provide the skilled operating management necessary to produce such steel, he can install an electric furnace with the assurance that he has the best piece of metallurgical apparatus available to secure his desired results.

Ideal Electric Furnace for the Foundry

BY F. J. RYAN, E. E. MC KEE and W. D. WALKER*

A SHORT study of all electric steel furnaces now admitted to be practical will show that the single phase, or single electrode furnace is in all respects one of the most simple. Its great simplicity in operation and construction eliminates confusing details and makes it possible for the foundry to change from converter or crucible steel practice to that of electric steel with least loss of time and with least change in the existing organization.

Many statements have been made that this or that electric steel furnace can or cannot operate on an acid or basic lining. This is a question of metallurgical skill in the operation of the electric furnace, and not of furnace construction. The fundamental principle in electric steel furnace construction is the proper application of heat and the reduction of heat losses. Heat may be conserved as well in a basic as in an acid lined furnace, except for the additional loss due to radiation resulting from the increased time necessary to refine the metal.

*The Snyder Electric Furnace Company, Chicago, Ill.

It is an advantage to have a way to reduce the voltage and the power input while holding the metal for refining so as to minimize this loss and to save the linings and the steel from overheating. As regards the application of the heat, single-electrode practice differs radically from three-electrode furnace practice, in the speed of melting down, but in any event both single and three-electrode furnaces are now operating on both basic and acid linings with commercial results.

COST OF PRODUCTION

Each power unit lost means a loss of profit on the ultimate product. As power is converted into heat in an electric steel furnace, time becomes a vital element of cost because efficiency in the use of heat consists in applying a certain quantity to secure a given result in the shortest possible time. The largest loss of heat in any heating equipment is that of radiation, and as radiation is time multiplied by surface, time again becomes an important cost element.

The reason why a single-electrode or single-phase furnace can produce the finished product in a short space of time is because in the single-phase furnace it is possible, with a high voltage and a long arc, to put into the furnace more power within a given period of time.

The simplicity of the electrode control apparatus in the single-electrode furnace has made it possible to develop the open roof type electric steel furnace. This type allows quick charging, preferably by mechanical means, thereby increasing the number of heats and cutting down heat losses during charging.

The number of heats that can be secured from an electric steel furnace also has an important bearing upon the consideration of the initial price of the equipment. The logical method of measuring the capacity of electric steel furnace equipment is by output over a given period of time and not by holding capacity. We must therefore admit that the furnace which can produce the greatest amount of material over a given period of time is the most economical unit when figured holding capacity for holding capacity. The single-electrode furnace delivers the quick heats and allows great production.

In Table 1 is a summary of the results obtained in a 3/4-ton single-electrode Snyder furnace in the plant of the Gerlinger Steel Casting Company, Milwaukee, Wis. This furnace was lined basic. It was guaranteed

is a 3000-lb. furnace. This depends upon the practice in the individual foundry. Some overload and some underload their furnaces. In a similar furnace to that at Dayton, the Crucible Steel Casting Company, Milwaukee, Wis., has charged as high as 3800 lb. and averages above 3000 lb. In a furnace rated at 1500 lb. the Gerlinger Steel Casting Company, Milwaukee, Wis.,

Table 3—Operation of a Single-Electrode Acid Furnace in the Plant of the Dayton Steel Foundry Co., Dayton, Ohio, June 9, 1916

Charging Time	Power on Time	Pouring Time	Finished Time	Charge pounds
2:06	2:50	4:00	4:12	2000
4:12	4:29	5:39	5:51	2000
5:53	6:05	7:13	7:26	2000
7:27	7:47	9:03	9:14	2000
9:15	9:45	10:52	11:01	2000
11:02	11:22	12:34	12:44	1800
12:45	1:14	2:30	2:40	2000
2:42	3:01	4:11	4:20	2000
4:22	4:46	5:56	6:06	2000
6:08	6:14	7:21	7:34	2000
7:35	7:51	8:58	9:08	2000
9:09	9:30	10:35	10:45	2000
10:46	11:06	12:30	12:52	2000
12:53	1:10	2:30	2:46	2000
Total time, 24 hours, 46 minutes.			Average melting time, 72 minutes.	
Total output, 27,800 pounds.			Average pouring time, 12 minutes.	
Average charging time, 22 minutes.			Average time per heat, 106 minutes.	

has charged as high as 2200 lb. and averaged over 1800 lb.

The electric furnace, no matter of what type, has now passed beyond the experimental stage and has entered into actual commercial operation, entirely separated from chance or unknown results. The steel foundryman can feel that in interesting himself in the electric steel furnace he is making a step forward in his field and business. The past year has indicated clearly the position that the electric steel furnace is to take in connection with the steel founding industry. Recent statistics covering the growth of electric steel for castings show that while in 1914 there was a production of 8551 tons of electric steel, the output for 1915 had jumped to 23,064 tons, an increase of nearly 200 per cent.

THE GRÖNWALL-DIXON FURNACE

The paper by John A. Crowley on a year's operation of the Grönwall-Dixon electric furnace at Detroit, Mich., already referred to, contains many interesting results in the field of electric high-grade alloy and carbon steels.

The X-Ray on Reinforced Concrete Columns

Successful experiments in photographing the iron reinforcements of concrete work with Roentgen rays are reported from Switzerland by E. Stettler of the Swiss Railway Department, and they are attracting much attention among Swiss engineers. U. S. Consul George N. Ifft, St. Gall, Switzerland, notes that by the use of special plates, adapted to any construction, Mr. Stettler has apparently obtained serviceable pictures of the inner structure of cement blocks. To eyes accustomed to pictures of great detail and much light and shadow the first results of the Roentgen exposure may seem rather meager, but the iron reinforcements in the pictures are shown in their proper size and location, as are also the connections and crossings, so that the imperfect ones can be clearly recognized.

The effects of vibration in structures are being studied by the Aberthaw Construction Company, 27 School Street, Boston, Mass., and a preliminary report of the investigation has been published in the shape of a 24-page pamphlet, which can doubtless be had for the asking. Some brief references are made to the effect of vibration on machine outputs, on the shop repair item, on the difficulties with line shafting, on the transmission of sound, and of vibrations in congested communities and even on the effect of vibration on the human element.

Table 1—Operation of a 3/4-Ton Single-Electrode Basic Furnace at the Gerlinger Steel Casting Co., Milwaukee, January, February and March, 1916

Total output, tons.....	274.23
Total electricity, kw-hr.....	146,160
Average kw-hr. per ton.....	533
Average lb. per heat.....	1,885
Average cost per ton metal in the ladle.....	\$28.93

to produce 3 tons of steel per 12 hr. with power consumption at the furnace not in excess of 880 kw-hr. per ton of steel. In actual practice this furnace has often produced four heats of 2000-lb. for a total of 4 tons in slightly more than 11 hr. The power consumption on the primary side of the transformer averaged only 533 kw-hr. per ton over the period of three months. A larger single-electrode furnace has since been installed by this company and is now operating with satisfactory results.

In Table 2 is a statement of physical tests of material produced in the plant of the Thomas Davidson Mfg. Company, Montreal, Canada. These results were obtained during the production of blanks for high-

Table 2—Chemical and Physical Tests on 4.5-In. High Explosive Shell Steel Made at Plant of Thomas Davidson Mfg. Co., Montreal, in Single-Electrode Acid Furnace

Carbon, Per Cent	Man-ganese, Per Cent	Sulphur, Per Cent	Phos-phorus, Per Cent	Yield Point, Tons Gross	Tensile Strength, Tons Gross	Elong-ation, Per Cent
0.45	0.87	0.039	0.039	22.5	48.3	23.2
0.44	0.88	0.041	0.037	19.4	38.5	22.6
0.45	0.80	0.049	0.036	24.1	48.3	23.2
0.58	0.80	0.047	0.042	22.3	47.9	20.1
0.43	0.78	0.045	0.040	22.9	48.3	26.8
0.45	0.69	0.047	0.033	19.1	35.4	26.2
0.46	0.70	0.039	0.038	22.5	44.5	25.6
0.48	0.70	0.039	0.039	20.7	39.9	21.3
0.41	0.78	0.047	0.038	20.7	41.6	25.0
0.34	0.85	0.045	0.040	21.5	46.3	19.5
0.41	0.76	0.041	0.045	22.1	47.4	23.6
0.46	0.80	0.041	0.055	23.5	48.7	23.2
0.45	0.62	0.039	0.041	22.7	41.7	23.2
0.49	0.65	0.039	0.047	23.9	49.5	15.8

Silicon varied from 0.17 to 0.29 per cent.

explosive shells in a 1 1/2-ton single-electrode furnace lined acid. The chemical and physical tests prove the control possible on this type of lining for foundry work.

Table 3 shows a record of a complete day's run in the plant of the Dayton Steel Foundry Company, Dayton, Ohio. This performance, the production of 14 heats of a ton apiece, melting cold steel scrap, over a period of 24 hr. and 40 min. is hard to believe. The furnace which made this run is a 1 1/2-ton single-electrode furnace lined acid. The question naturally arises why this furnace was charged with only 2000 lb. if it

OBITUARY

J. Wallace Page

J. Wallace Page, founder of the Page Woven Wire Fence Company and known as the father of the woven wire fence industry, died Saturday, Sept. 9, at his home in Adrian, Mich., aged 73 years. He was born on a farm in Lenawee County, Mich. He received his education in public schools and Adrian College. When barely 20 he enlisted in the Union army and served from 1863 to the end of the Civil War. For 20 years thereafter he was a farmer.

Seeing the desirability of more dependable fences, Mr. Page turned to the use of wire, although it then cost 14c. per lb. He did not favor barb wire for this purpose but conceived the idea that the nearest approach to permanency in a fence would be secured by making it of horizontal wires tied together with sufficient vertical cross wires to preserve the spacing. His first woven fence had cross wires about one foot apart, woven by hand, a wire at a time. It was erected in May, 1883, and subsequently he sold three miles of it to acquaintances, obligating himself to weave it. The following spring wooden looms were built by Mr. Page and a neighbor farmer in an old wagon shop in the village of Rollin, a mile from the farm. With these primitive contrivances several thousands of rods of fencing were slowly woven, much of which is still in service.

Mr. Page then associated with him his cousin, Charles M. Lamb, a farmer boy of 18, who had mechanical instincts, in efforts to evolve a more efficient weaving apparatus. This proved a happy selection, for throughout the entire history of the Page enterprise the major portion of the machinery and the appliances used in fence-making have been the products of Mr. Lamb's genius and industry, and the erection and operation of the large plant at Monessen, Pa., were under his general supervision. The work of construction of the power fence-weaving loom was done in the city of Hudson, and fence was woven there from 1886, but in 1888 the loom was removed to a small building which still constitutes a portion of the Adrian plant of the company.

It took many years of hard work and educational effort to bring farmers to see the advantage of woven wire fencing, but in the course of time patience, perseverance and the liberal expenditure of money in advertising brought their reward. Until 1898 the manufacturing activities of the company were confined within the Adrian plant, which had by that date expanded to many times the original floor space. It was then made apparent that the company must at some time produce its own wire. Plans were made for a wire mill and a location was secured at Monessen, Pa., near Pittsburgh. Hardly had the wire mill been placed in operation, when it was discovered that wire rods were almost as much of a market problem as had been the finished wire, and it was found necessary to add to the Monessen plant steel manufacturing facilities capable of supplying the company's needs from the pig iron to the galvanized wire. Mr. Page was the official head of the corporation from its creation down to a few years ago, when physical troubles compelled some relaxation from arduous activity and at the time of his death he was first vice-president of the company. He leaves two sons and a daughter.

WILLIAM H. JONES, vice-president of the International Harvester Company, died Sept. 1, at Pasadena, Cal. Concerning him, Cyrus H. McCormick, president, said: "He had come as a boy from a farm in Wales to a farm in Wisconsin; he had learned at first hand the farmer's needs, and he learned personally how to make and to sell the machines that met these needs. From farm hand to farm machinery salesman, from salesman to agent, to superintendent of agents, to the organizer and director of a successful manufacturing company, was the road he traveled between 1866 and 1881. It was not an easy road. Twenty hours a day,

it is told of him, was not too long to work when he was selling mowers and reapers up and down Wisconsin in the sixties. By these experiences he became the master of every detail in the harvester business. To the formation of the Harvester Company Mr. Jones brought the Plano works, one of the five principal plants of the consolidation."

FRANK McMILLAN STANTON, treasurer of the Mohawk and Wolverine copper mining companies, and one of the most prominent mining engineers in the country, died Sept. 12 at his home at Whitestone, Long Island, aged 52 years. He was born in New York City, and was the son of the late John Stanton, long a leading figure in the copper trade. He was graduated from the Columbia School of Mines in 1887. For 23 years he was superintendent of the Atlantic Mining Company. In 1910 he retired on account of failing health and visited the mining districts of Europe for a vacation. In 1914 he was elected to the offices he held at his death. In addition, he was president of the Fort Mountain Talc Company, a director of the First National Bank of Houghton, the Ohio & Kentucky Railroad, the Copper Range Company, and a number of other corporations.

LEVI J. GUNN, one of the founders of the Millers Falls Company, died Sept. 9 at his home in Greenfield, Mass., aged 86 years. He was born in Conway, Mass., learned the machinist trade, and in 1853 removed to Greenfield, where he worked in local shops until 1864, when, in company with Charles H. Amidon, he began the manufacture of clothes wringers. In 1868 the Millers Falls Company was started and he became treasurer and manager, continuing in these capacities until 1901, when he was elected president of the company. He held this position until 1910, when he retired. He had been a member of the State Senate and of the Governor's Council and active in financial affairs.

JOHN V. BECKMAN, for many years a valued officer of the Lidgerwood Mfg. Company, Brooklyn, died Sept. 11 at his home in Plainfield, N. J., aged 75 years. From 1873, when the company was established, until a few years ago he had charge of its shops and of the designing of all machinery. After his retirement from active service he continued his connection with the company in an advisory capacity.

FREDERICK WISTAR MORRIS, formerly a member of the firm of Morris, Wheeler & Co., Philadelphia, retiring a few years ago, died Sept. 5 at his summer home at Chelsea, Atlantic City, aged 74 years. He leaves his widow, two sons and four daughters.

JOHN A. BERGER, one of the founders of the Berger Mfg. Company, Canton, Ohio, manufacturer of sheet metal building products, died Sept. 8, aged 69 years. He retired from actual business several years ago.

Puddlers working in bar-iron mills in the Central West that sign the Amalgamated Association scale will be paid \$9.30 per ton for September and October, the highest price ever paid for puddling under the Amalgamated scale, being an advance of 50c. per ton over the rate for July and August. The Girard Iron Company, which operates a large non-union puddling plant at Girard, Ohio, and the Youngstown Sheet & Tube Company, which has a puddling plant at East Youngstown, Ohio, always pay the Amalgamated rate for puddling and will advance their puddlers at once to the \$9.30 rate.

A cooling tower, 150 ft. long, 50 ft. wide and 75 ft. high has been completed at the Anderson, Ind., plant of the American Steel & Wire Company. It was built by the Wheeler Condenser & Engineering Co., Carteret, N. J. It has a yellow pine frame with cypress sheathing and filling. It has two chimneys which rise above the cooling stacks and create the air circulation by natural draft. The capacity of the tower is 7300 gal. a minute cooled from 115 to 85 deg.

The Fairmont Mining Machinery Company, Fairmont, W. Va., will increase its plant capacity about 50 per cent. at an early date. About 100 additional workmen will be added.

German Pig-Iron Syndicate Renewed

The German Pig-Iron Syndicate has been renewed until the end of 1920, after long negotiations. It is one of the largest of the German cartels and is an important factor in the German steel industry. The new organization consists of 34 companies, or less than the number in the original syndicate. Some of the producers have amalgamated while others now consume their own pig iron.

The total of allotments remains the same, but the percentages have been changed considerably. The allotment of the Gelsenkirchen works, the largest member, is increased from 234,000 tons in 1915 to 283,000 tons in 1918; that of the Gutehoffnungshütte from 101,000 tons to 141,000 tons; that of the North German Steel Works in Bremen from 100,000 tons to 150,000 tons, and that of the Hohenzollern works at Emden from 50,000 tons to 110,000 tons. All the blast furnaces recently established on the German seacoast show large prospective increases in output.

Since the war the sales have been little more than half the allotments. For 1914 and 1915 the estimated total allotment was 2,840,796 tons; for 1916 and 1917 it is 2,955,796 tons; for 1918, 2,992,446 tons, and for 1919 and 1920 it is 3,002,466 tons, indicating an expected large demand.

Included in the new syndicate are the Hoesch Steel Works, the Bochum Works and a group of smaller ones in the Siegen district. The Hoesch Works consumes all it makes, and the Siegen makers have an understanding with the syndicate which restricts their output and confines their competition to their own locality. The Phoenix Steel Works gives notice that it will leave the syndicate at the end of this year, probably because it will use its own pig-iron output.

Federal Export Corporation

The Federal Export Corporation, 111 Broadway, New York, through its Paris office, recently secured a contract to supply the Paris-Orleans Railroad, France, with about 6000 steel tires for locomotives, tenders and cars, and also with car springs, etc. It has had other contracts for railroad material, some of which was shipped to the Eastern Railway of France and the General Omnibus Company of Paris. The corporation has so far been active principally in France, but ultimately will extend to other countries. It has an office and several representatives in Paris, and is in receipt of daily cables from that city. It has sold a quantity of steel products to French consumers through its Paris office.

Allied Machinery Company

The Allied Machinery Company of America, recently acquired as a subsidiary by the American International Corporation, elected the following officers and directors Sept. 8: Chairman, Samuel McRoberts; president, R. B. Sheridan; vice-president, Charles E. Carpenter; vice-president and treasurer, R. P. Tinsley; secretary, Ames Higgins; assistant treasurers, Everett Brown and Percy Mayes; assistant secretary, Kenneth F. Clark; directors, G. J. Baldwin, John E. Gardin, Robert F. Herrick, Samuel McRoberts, Oscar E. Stevens, Charles E. Carpenter, J. F. Hartley, W. S. Kies, R. B. Sheridan, R. P. Tinsley.

Further information regarding the plans of the Mansfield Sheet & Tin Plate Company, Mansfield, Ohio, to enlarge its plant has been given out by the board of directors. It is intended to erect a new mill building on the site recently acquired adjoining the present plant and to equip it with electrically operated mills, increasing the capacity from 2800 to 6000 tons per month. It is hoped to have the new plant in operation by March.

Part of the rolling-mill plant at Duncannon, Pa., was destroyed by fire Sept. 10 at a loss of about \$20,000. Operations will be impeded, if not suspended, until the building is replaced and new machinery installed. The plant is owned by the Lebanon Iron & Steel Company, Lebanon, Pa.

PERSONAL

The death of George Gilmour, chief engineer of the Travelers Insurance Company, Hartford, Conn., has made several important changes necessary in the engineering and inspection division. The company has been engaged in safety engineering for the purpose of accident prevention for more than 20 years, and Mr. Gilmour was prominent in this work. John L. Thompson, who has been Mr. Gilmour's chief assistant, assumes general charge of the division with the title of superintendent. He is a graduate of the Sheffield Scientific School of Yale University. Allan D. Risteen takes the title of director of technical research and safety publication work. He is a graduate of the Worcester Polytechnic Institute. William P. Eales, formerly supervising inspector at the Philadelphia branch office, has been transferred to the home office, assuming the title of assistant superintendent. William Ferguson, formerly supervising engineer at Detroit, has been transferred to the home office as traveling supervising engineer.

J. C. Weston, since 1914 general sales manager of the United States Tire Company, has accepted the position of vice-president of the Mitchell Motors Company, Racine, Wis., in charge of sales and promotion to succeed Otis C. Friend, who left Aug. 15 to become vice-president and general manager of the United Motors Company, New York.

Charles S. Slaker, sales manager of the Janesville Machine Company, Janesville, Wis., has resigned to become general sales manager of the Stover Engine & Mfg. Company, Freeport, Ill., the recent consolidation of the Stover Engine Works and the Stover Mfg. Company.

Dr. George S. Hessenbruch, assistant chief engineer of power plants of the Union Electric Light & Power Company, St. Louis, Mo., and superintendent of works of the St. Louis County Gas Company, Webster Groves, Mo., has severed his connection with these companies and opened offices in the Victoria Building, St. Louis, as consulting engineer, making a specialty of gas and gas works operation and construction, and particularly gas coal by-products. He has had a long experience in both construction and operation.

P. V. Carney, assistant superintendent of the Bessemer converter department, South works, Illinois Steel Company, has resigned to become superintendent at the South Bethlehem works of the Bethlehem Steel Company.

Fred M. Wertz has resigned as sales manager for the Thurlow, Pa., plant of the American Steel Foundries, to take charge of the New Haven, Conn., plant of the Penn-Seaboard Steel Corporation of Philadelphia.

Expansion of a German Steel Plant

The Stahlwerk Becker Actien Gesellschaft, Willich, Germany, doubled its capital stock on June 30 last to \$3,808,000 (16,000,000 marks). It paid 25 per cent in dividends in the 1914-15 year, and it is reported that the distribution will not be less for the present fiscal year. At present, according to U. S. Consul Henry C. A. Damm, of Aix La Chapelle, Germany, this company is dependent upon outside sources for its raw material, but it is planned to acquire iron mines and to build new blast furnaces, tin-plate mills, pipe and tube plants and coke ovens, and to enlarge the electric steel and wire-drawing plants. The company expects that after the war there will be a large and urgent demand for some time for quality steel of all kinds.

The Mutual Motors Company, manufacturer of the Marion-Handley automobile, has bought the large plant at Jackson, Mich., owned by the Imperial Automobile Company, which it has been occupying under lease for the last year and a half. The plant has facilities for the production of 100 automobiles a day. The plot comprises about 17 acres, with substantial buildings and with ample room for expansion.

STRIKES AND SETTLEMENTS

The New England Situation

F. H. Payne, vice-president of the Greenfield Tap & Die Corporation, Greenfield, Mass., who is also vice-president, not secretary, of the F. E. Wells & Son Company of the same place, makes a few corrections in the statement which appeared relative to his companies on page 561 of THE IRON AGE of Sept. 7. The name of the Wells Company should have been printed F. E. Wells & Son Company and not A. H. Wells. Further, the F. E. Wells & Son Company has absolutely nothing to do with the Greenfield Tap & Die Corporation, being a company by itself. The Greenfield Tap & Die Corporation has three divisions, called the Wells Brothers Company division, the Wiley & Russell Mfg. Company division and the A. J. Smart Mfg. Company division. Mr. Payne also says: "We have had 176 men walk out of our Wiley & Russell plant, out of 376; 43 out of our Smart plant, out of 128; and 86 out of our Wells plant, out of 409, productive labor. The demands made upon our three divisions of the Greenfield Corporation and upon the F. E. Wells & Son Company were the same, namely, 8 hr. and time and one-half for overtime, double pay for Sunday, etc. All of our factories run 54 hr. We have posted notices that the employees who wish to be reinstated must return for work within two weeks from the time they struck; otherwise their places will be filled."

Conferences held last Friday and Saturday between the management of the Pittsfield, Mass., plant of the General Electric Company and the striking employees were fruitless. The strike has been extended to nearly every department, and only a small portion of the force of 6300 hands is reported to be at work. A statement issued by General Manager Chesney on Saturday practically reiterated his position as given out at the beginning of the trouble.

It is feared that trouble will develop at the Goodell-Pratt Company's plant, Greenfield, Mass.

The 600 strikers at the plant of the Westfield Mfg. Company, Westfield, Mass., voted, Sept. 7, to return to work Sept. 11. President Walker is to investigate at once the cases of the four men laid off, and the framing of a new working agreement, to replace the one which expired a week ago, is to be taken up not later than Thursday.

Conditions in New Haven and Bridgeport, Conn., show some improvement, but the foundries in the latter city are operating only in a limited way.

Nashville Machinists Win Demands

Three of the five principal machine shops in Nashville, Tenn., met the demands of their employees for an 8-hr. day when these demands were presented, and are now operating on that basis. At last reports, 25 machinists from two other shops were still out, although the steam fitters and other workmen in these shops remained at work.

Some of the steam fitters and helpers employed at the plant of the Wilmington Steel Company, Wilmington, Del., are on strike in an effort to secure an increase of 5c. per hour.

The Harvey Spring & Forging Company, Racine, Wis., has distributed among its employees checks equal to from 1 to 5 per cent of the annual wage, depending upon the length of continuous service. The company expects to make this profit-sharing plan a regular feature, the bonus to be paid each year, about Aug. 1. All men in continuous service for one year received 1 per cent; two years, 2 per cent; three years, 3 per cent; four years, 4 per cent; and five years or more, 5 per cent.

Powdered coal burning is to be employed by the Armstrong Whitworth Company, Montreal, Que. The Bonnot Company, Canton, Ohio, has closed a contract for the Holbeck system for the present smaller heating furnaces, the ingot annealing, pot annealing and rolling mill furnaces, and also for new tire annealing, reheating and continuous ingot heating and other heating furnaces.

Co-operation in Export Trade Must Wait

WASHINGTON, D. C., Sept. 9, 1916.—After more than nine months' consideration, the omnibus revenue act was finally passed, and signed by President Wilson yesterday. As predicted in this correspondence, the chief provisions of the measure were formulated by the conference committee, including a complete revision of the munitions sections. The estimates as to the amount of revenue the measure will raise vary, some of the majority leaders placing it as high as \$240,000,000. The most conservative estimate places the amount at approximately \$200,000,000. The tax upon the net profits of munitions manufacture was fixed at 12½ per cent.

Notwithstanding strenuous efforts made, the proposition to include in the revenue measure the provisions of the Webb bill authorizing the formation of combinations in the export trade, and exempting such combinations from the operation of the Sherman and other anti-trust acts, was defeated, certain Senators announcing that they were ready to prolong the session indefinitely to prevent such inclusion in the bill.

The Senate and the conference committee followed the action of the House in limiting the salaries of members of the tariff commission to \$7,500 per annum, and under the terms of the tariff commission sections the President can appoint defeated Congressmen to the commission, or other men who are undesirable, for such important work as may fall to this commission. The tariff commission sections of the act are as previously outlined in this correspondence.

W. L. C.

Selling Farm Machinery in Russia

A way for developing an agricultural machinery business in Russia is discussed in London *Engineering* by a correspondent, who urges co-operation with the Russian Zemstvo Union, one of which has been formed in each district of Russia and Siberia, of wealthy farmers, peasants, etc., who are at present dealing with the supplies for the army. This union, he says, could be approached at the present time by manufacturers, to enter into co-operation with them to supply the Russian or Siberian farmer, on the conclusion of hostilities, with agricultural machinery or implements, say on a three years credit. The Zemstvo could arrange for the supply and for collecting the payments on the machinery co-operatively, a percentage of the crop from the farm each year being put aside to pay for the machinery, the Zemstvo paying the total amount to the manufacturer. The manufacturers would thus have a wealthy society to guarantee the payments, and, being a local society, it would know the conditions of each farm. Manufacturers would require to amalgamate and to deal through a central office with the Zemstvo Union in Russia. It would be necessary to see that this ring of manufacturers received the necessary financial backing.

Higher Costs of Electrical Machinery

Advances have been made on all kinds of machinery, but in some cases they have not kept pace with the increased costs of the builders. This is true in the electrical field. Small generators and motors, of necessity have been marked up, but selling prices are not on a line with manufacturing costs. Records taken from the books of a manufacturer of portable electric tools are of interest. The following shows the increases in manufacturing costs of a ½-in. drilling machine, as compared with the same manufacturer's records two years ago:

	Increase
8 lb. aluminum.....	\$2.40
Commutator.....	.75
Copper wire.....	1.00
Gears.....	.50
½-in. standard chuck.....	2.75
Labor (approximately).....	1.50
Total increase.....	\$8.90

These drilling machines were quoted before the war at \$68, and the price to-day is \$72, an advance of only \$4. As will be seen, the increase in manufacturing costs is more than twice as much.

Machinery Markets and News of the Works

MOTOR CAR PLANTS EXPAND

Ford to Spend Millions at Detroit

General Situation Continues Healthy, Though Deliveries Still Hamper Business—Big Export Company Placing Stock Orders

Detroit reports unusual industrial activity. The plan of the Pennsylvania Lines to enter that city will mean the expenditure of a large amount of money. That the Ford Motor Company intends to spend millions in enlarging its plant is confirmed. The Studebaker Corporation is also planning to expend about \$1,500,000 for new buildings in Detroit.

In New York, both sales and inquiries are more numerous, and more would be done in this city and elsewhere were prompt deliveries of standard machine tools more easily obtained. The buying of 70 lathes for export to Russia is reported, and the Allied Machinery Company of America is placing large stock orders. Gould & Eberhardt, Newark, N. J., who are building a new plant at Irvington, N. J., have been buying recently.

A general improvement is noted in Cincinnati, although business placed in that city by the automobile factories is lighter. In Cleveland, the Peerless Motor Car Company will erect three new buildings to be devoted to the manufacture of pleasure cars, permitting its present plant to be used for the manufacture of motor trucks. Dealers in Cleveland could sell more tools were deliveries easier.

In Chicago, inquiry from industrial sources is of good volume, and the demand in Milwaukee continues persistent.

Business in San Francisco was halted by fear of a railroad strike, but it is now going forward again. Exports from San Francisco in 1915 were 100 per cent greater than in 1910.

In the Pacific Northwest, distress is being caused by a shortage of cars; otherwise, conditions are good. The production of lumber, most important in Washington and Oregon, is proceeding on a normal basis.

New York

NEW YORK, Sept. 13, 1916.

As was expected, the passing of Labor Day brought an increased number of inquiries from miscellaneous directions. Incidentally not a few orders were placed without the formality of inquiring. Practically all of the activity is on the part of industrial buyers. It is noteworthy that the larger manufacturers have great confidence in the future, and when they see a need do not hesitate to fill it. It is not expected that this month's business will be as heavy as that of August, because of the large orders for big lathes in the latter month. The current buying by munitions makers at the present time is confined to one or two tools now and then.

The Allied Machinery Company of America is placing large stock orders. A firm of dealers recently received two orders for Russia, one specifying 50 machines and the other 20. They have not been shipped as yet. Shipments to Italy have been delayed because of difficulty in reserving steamship space.

Of late there has been a good run on bench and precision lathes, the former being used for gage and fuse work. Deliveries on some makes of precision lathes are several months away.

Gould & Eberhardt, Newark, N. J., makers of shaping and gear cutting machines, continue to buy equipment for their new plant at Irvington, N. J.

Jabez Burns & Sons, manufacturers of machinery for coffee, etc., 600 West Forty-third Street, New York, will build a six-story addition to their factory on a site 50 x 100 ft.

The Eastman Kodak Company, Rochester, N. Y., has taken out a permit for the erection of an addition to one of its camera manufacturing departments, 43 x 148 ft., to cost about \$40,000. It will be four stories, of reinforced concrete.

James Cunningham, Son & Co., Rochester, N. Y., have doubled their foundry capacity and have erected a four-story addition to take care of their increased business. They manufacture automobile ambulances, etc.

The Rochester Ball Bearing Company, 203 State Street, Rochester, N. Y., has been incorporated with a capital stock of \$5,000, and will specialize in the manufacture of steel balls and ball thrust bearings. Joseph B. Robinson, Barnards, N. Y.; Carl M. Weber, 25 Bengal Terrace, and George C. Hannemann, 611 Garson Avenue, Rochester, are the directors.

The McCoy Iron Works, structural and ornamental iron worker, which maintains an office and works at Seaman Avenue and Mattano Place, Perth Amboy, N. J., has purchased a factory site, 100 x 400 ft., on Mortimer Street, Utica, N. Y., and has taken option on adjacent sites, 25 x 400 ft. and 50 x 100 ft. It is having plans drawn for the erection of a bridge shop, office, garage and storage building, to be built next spring. The bridge shop will be 65 x 280 ft., one story, of steel and corrugated iron. The company will require some bridge shop equipment, although its specifications for this are not yet complete. The plant will have railroad siding connection and will be used for fabricating bridge and structural steel work. M. A. McCoy is president.

The city of Batavia, N. Y., has awarded a contract for an automatic electric sewage pump to Root, Neal & Co., Buffalo.

The Rice & Adams Dairy Machinery Company, Buffalo, N. Y., will shortly take bids for the construction of a three-story factory, 60 x 150 ft.

The Delaware, Lackawanna & Western Railroad Company, 90 West Street, New York, will take bids on the construction and equipment of a powerhouse at Buffalo, estimated to cost about \$18,000. G. L. Ray is chief engineer.

The Crescent Tool Company, 200 Harrison Street, Jamestown, N. Y., will erect a one-story factory, 48 x 171 ft., to cost about \$15,000.

The Raritan Copper Works, Perth Amboy, N. J., is taking bids for a two-story addition to its foundry, 33 x 43 ft., to cost about \$8,000.

The J. F. Turner White Metal Works, Highland Park, N. J., is taking bids for the construction of a two-story addition to its factory, 39 x 63 ft., to cost about \$8,000.

The New Jersey Water Service Company, Haddonfield, N. J., is taking bids for the erection of a one-story pumping station, 24 x 47 ft., to cost about \$3,500.

The Interstate Machine Company, Troy, N. Y., has complete plans for a two-story factory which it will erect at Seventh Avenue and Down Street.

The Underwood Paper Company, Glens Falls, N. Y., has let general contract for the construction of a mill, 80 x 100 ft., two-stories, and a machine shop, 35 x 50 ft., at Plattsburg, N. Y., to cost \$90,000. Thomas F. Adriance is vice-president and manager.

The McKinnon Chain Company, Tonawanda, N. Y., Wm. L. Notman, secretary, has let contract for a one and two-story addition, 96 x 43 ft., to its plant at Fremont Street and the Erie Railroad.

The Rand Company, 97 Goundry Street, North Tonawanda, N. Y., manufacturer of bank and office furniture and systems, is having plans prepared for a three-story addition, 67 x 102 x 125 ft., of reinforced concrete, estimated to cost \$45,000. J. H. Rand is president.

The Barden & Robeson Corporation, Penn Yan, N. Y., has filed incorporation papers with a capital stock of \$100,000 to manufacture hubs, spokes, woodenware, etc. G. L. and M. R. Barden and R. J. Robeson are the incorporators.

The McKinnon Dash Company, Buffalo, is building a one-story brick addition to its factory at Amherst and Kail streets.

The Cataract Refining & Mfg. Company, Marine National Bank Building, Buffalo, W. G. Noncreek, president, is erecting a two-story addition, 62 x 80 ft., at its plant at Gilbert and Manitoba streets and the Erie Railroad to cost \$18,000.

The New England Dressed Meat & Wool Company, Howard and Babcock streets, Buffalo, is adding a third story to its brick engine and boiler house at a cost of \$10,000.

The Tolhurst Machine Works, Troy, N. Y., is erecting a one-story warehouse addition, 60 x 120 ft., to its plant on Green Island. William H. Tolhurst is president.

The Brown-Lipe Gear Company, Syracuse, N. Y., has let general contract for the remodeling and enlargement of its factory at Fayette and Geddes streets.

The Hahn Paper Company, Watertown, N. Y., has let contract for the erection of a storehouse and machine shop at its plant to cost \$15,000.

Contract has been awarded by the Kerr Turbine Engine Company, Wellsville, N. Y., for the erection of a pattern storage building.

New England

BOSTON, MASS., Sept. 11, 1916.

The Baldwin Chain & Mfg. Company, Worcester, Mass., has leased the four-story factory building being erected by the Worcester Cold Storage & Warehouse Company on Hygeia Street. The company expects to take possession by Jan. 1 and will operate the plant as a branch factory, moving its heavier machinery from the Chandler Street plant, which will then be used only for the manufacture of its lighter products. The company is a large producer of automobile chains and sprockets and is sharing in the general prosperity of the automobile industry.

The New Britain Machine Company, New Britain, Conn., has purchased land on Elm Street to provide for future expansion of its plant.

The National Lamp Works of the General Electric Company, Providence, R. I., is asking bids on an addition, 80 x 400 ft., with three wings, 60 x 144 ft. each, two stories.

The R. E. Kidder Company, Worcester, Mass., has been incorporated with capital stock of \$15,000. The directors are William H. Brown, president; Frederic C. Condy, 344 Main Street, treasurer, and S. H. Clary.

The American Brass Company, Waterbury, Conn., has awarded to the Turner Construction Company, New York, a contract for the erection of a factory, 50 x 202 ft., three stories, on South Main Street.

The Improvements Mfg. Company, Boston, Mass., has been incorporated with capital stock of \$50,000 to manufacture machinery. The directors are John F. Towle, president; Basil V. Szabo, Cambridge, treasurer, and J. O. Burdett.

The Waterbury Farrel Foundry & Machine Company, Waterbury, Conn., has bought the Earle House, an old Waterbury landmark, to provide room for plant expansion. No definite plans for the use of the property have been made.

The Weco Mfg. Company, Boston, Mass., manufacturer of electric and gas heating appliances, has been incorporated with a capital stock of \$50,000. The directors are William H. Williams, president; Harry B. Eaton, Waban, treasurer, and D. H. Fisher.

Baltimore

BALTIMORE, MD., Sept. 11, 1916.

The Poole Engineering Company, Woodbury, Md., is reported to have preliminary plans in preparation for a one-story addition to its gun shop, 20 x 58 ft., to cost about \$2,500.

The Electric Hose & Rubber Company, Twelfth and Durest streets, Wilmington, Del., has had plans prepared for a one-story machine shop, 40 x 100 ft., to cost about \$8,000.

The Anderson Pneumatic Tire & Spring Company, Union Trust Building, Washington, D. C., has had plans drawn for a one-story factory, 100 ft. square, to cost about \$30,000.

Barber & Ross, Eleventh and G streets, N. W., Washington, D. C., manufacturer of fire escapes, will erect a steel frame building, 80 x 300 ft., at a cost of about \$24,000. It will remove its equipment from the present shop to the new plant, which will have an annual capacity of about 10,000 tons. Electric cranes will be required. Harry Blake is general manager.

Philadelphia

PHILADELPHIA, PA., Sept. 11, 1916.

The Swind Machinery Company, Widener Building, Philadelphia, is seeking equipment suitable for the manufacture of bicycle spokes, requiring one machine for making the heads and another for rolling the threads.

The Keystone Motor Mfg. Company, manufacturer of automobile motors, which started the construction of a new plant at East Greenville, Pa., on a tract of over six acres acquired for that purpose, has now completed it and has removed from 40 North Sixth Street, Reading, Pa., its former location. It has also erected a new foundry, which is now running on semi-steel for cylinder castings. A. H. Yocum is president and general manager.

The Cameron Engineering Company, East Stroudsburg, Pa., has started the construction of a machine shop, 71 x 112 ft., one story, to cost about \$10,000.

The John E. Sjostrom Company, 1719 North Tenth Street, Philadelphia, cabinet maker, is having plans prepared for rebuilding its four-story factory at an estimated cost of \$30,000.

Work was started a few days ago on an 180-ft. addition to the West End machine shop of the Steelton plant of the Bethlehem Steel Company. A 100-ft. addition was added recently. Work has also been started on the installation of a 500-ton press in the eye-bar mill. Extensive improvements are also contemplated for the bridge shop.

Shoemaker & Co., Pottstown, Pa., have received contract to construct an addition, 40 x 120 ft., to the steel plate mill of the Nagle Steel Company at Pottstown. Other improvements are contemplated. The Nagle Steel Company is running both its Glasgow and Seyfert mills night and day, employing 200 workmen.

The Ball Seal Generator Company, Easton, Pa., has been incorporated with a capital stock of \$10,000 by Edmund F. Gephardt, Charles P. Ayres, Raymond L. Gephardt, George Macon, Jr., and William A. Tydeman to manufacture steam and hot-water generators and specialties.

The American Makers' Corporation, Perkasee, Pa., has been incorporated with a capital stock of \$10,000 by Frank R. Harr, Enos A. Wampole, Tobias S. Bissey, Irwin Y. Baringer and Christian P. Fox to manufacture toys and novelties.

Chicago

CHICAGO, ILL., Sept. 11, 1916.

The general trade in machine tools is being maintained in good volume. A pronounced increase in sales to domestic manufacturers, including twenty 20-in. drilling machines, thirty 27-in. lathes and a lot of 30-in. lathes has offset the slight decline in export business. Many of these orders are being filled with tools of less prominent make, inasmuch as builders of the long-established standard lines are in little, if any, better position to make deliveries. Unfilled orders on their books are still eight and nine months old.

The expected outpouring of used tools, particularly special purpose equipment, has not yet made its appearance. In Chicago the demand for second-hand machinery still exceeds the supply. Dealers, however, are more cautious and are unwilling to pay as high prices as formerly, or those asked in most instances.

Railroads are buying only those tools needed for immediate use. Most of the Pennsylvania's requirements are being filled at Pittsburgh.

The Northern Pacific Railway, St. Paul, Minn., has under consideration shop extensions involving an expenditure of from \$2,000,000 to \$10,000,000, which will include a plant to repair and probably manufacture steel cars at Milwaukee. F. G. Prest is purchasing agent.

C. E. Krebs, for the past eight years superintendent of the Forsyth Brothers Company, has organized the Krebs Mfg. Company, 341 East Ohio Street, Chicago, and will specialize in the manufacture of tools and dies.

The Douglas Iron Works, Chicago, has been incorporated with a capital of \$1,000 by E. Peterson, Isadore Brown and Irving Zimmerman, 155 North Clark Street.

Morrice Leviton, 155 North Clark Street, Chicago, architect, has awarded contracts for a two-story automobile repair shop, 30 x 50 ft., to cost \$7,000.

Thomas C. Dennehy, 229 West Randolph Street, Chicago, is building a one-story auto service station, 94 x 110 ft., at 18 East Twenty-fifth Street to cost \$20,000.

The Armstrong Brothers Tool Company, Chicago, has awarded contracts for a three-story addition to its machine shop and a one-story forge shop at an estimated cost of \$55,000.

Myron H. Spades, 110 South Dearborn Street, Chicago, is having built a one-story factory, 133 x 266 ft., and a foundry and forge shop, 60 x 161 ft., to cost \$45,000. It will be occupied by the Accurate Engineering Company, 2419 West Fourteenth Street.

The Wheeling Corrugating Company, Chicago, has purchased property, 124 x 627 ft., at the corner of Harvard Street and Campbell Avenue, upon which it will construct a factory to cost \$50,000. Paul Gerhardt, 64 West Randolph Street, is the architect.

The Burnside Steel Company, Chicago, has been incorporated with a capital of \$100,000 by H. F. Wardwell, 50 East Jackson Boulevard; George L. Pollock and J. R. Pollock.

The National Ox-Hydric Company, Chicago, has changed its name to the National Machinery Company and has decreased its capital stock from \$500,000 to \$5,000.

The American Printing Ink Company, Chicago, will erect a two-story factory at 2314-16 West Kinzie Street, to cost \$30,000. S. S. Joy is the architect.

The Orkney Springs Company, Chicago, has been organized with a capital of \$500,000 by James E. McGrath, 69 West Washington Street; Charles C. Cirese and J. Fred Reev.

Fire in the boiler room of the Velie Carriage Company, Moline, Ill., caused a loss of about \$1,300.

The S. Ward Hamilton Company, Chicago, manufacturer of steel specialties, is building a factory at Harvey Ill., and expects to have machinery installed and begin operations about Oct. 15.

The Boone Tire & Rubber Company, Belvidere, Ill., will not let contracts for its new building or equipment for at least 60 days. The initial plant, however, will contain 25,000 sq. ft. of floor space and the buildings will be U-shaped. The main building will be 50 x 180 ft., with two wings, 60 x 120 ft., and will have a capacity of 150 casings per day. I. V. Maclean, formerly president and general manager of the Hawk-eye Tire Company, is president.

Cincinnati

CINCINNATI, OHIO, Sept. 11, 1916.

Considerable improvement is noted in the machine-tool business, not confined to any particular branch of the trade. The railroads are now buying more machines, but, on the other hand, business with automobile factories has let up a bit. Orders from the general trade for single tools are increasing in volume and lately drilling machines have shown some improvement. Makers of sugar machinery are shipping out some large outfits, most of which are consigned to Cuba. Wood-working machinery is slow. The local foundries are all busy and outside contract work is easy to obtain.

The Springfield Mfg. Company, Cincinnati, has been incorporated with \$10,000 capital stock by Anthony Bury, Albert Ficks and others. It will fit up a plant on York Street for manufacturing automobile springs.

The Max Woche & Sons Company, Cincinnati, manufacturer of surgical instruments, is planning an addition to its plant on College Street.

The Globe Register Company, Cincinnati, has commenced work on its new four-story factory on East Sixth Street, estimated to cost \$80,000. Some equipment will be required.

The Cincinnati Milling Machine Company, Oakley-Cincinnati, has taken out a permit for a one-story addition to its plant, estimated to cost \$30,000. It will be used principally for storage purposes.

It is reported, but not officially confirmed, that the Hirsch Rolling Mill Company, St. Louis, Mo., intends to establish a branch plant in Cincinnati.

The plant of the Dayton Iron & Metal Company, Dayton, Ohio, was badly damaged by fire last week. Repairs have been commenced.

The Pasteur-Chamberland Filter Company, Dayton, Ohio, is the name of a new company that has taken over the interests of the Pasteur Filter Sales & Repair Company, the Automatic Lamp Control Company and the Dayton Spinning & Novelty Company. An addition to its plant is considered.

The Fyr Fyter Company, Dayton, Ohio, whose incorporation was recently noted, will build a plant for the purpose of manufacturing fire extinguishers. R. C. Iddings is general manager.

It is rumored that the Pennsylvania Railroad intends to enlarge its repair shops at Piqua, Ohio.

The Shawnee Refrigerating Company, Xenia, Ohio, has awarded contract for an addition to its plant.

The General Service Company, Portsmouth, Ohio, recently

incorporated with \$10,000 capital stock, by E. D. Stevens and others, will fit up a general machine shop for repair work.

The Puritan Brick Company, Wellston, Ohio, expects to add enough equipment to its plant to nearly double its present output.

Cleveland

CLEVELAND, OHIO, Sept. 11, 1916.

The demand for machine tools has quieted down somewhat. No new lists have come out but a steady volume of orders is noted, mostly for single machines. The American Steel & Wire Company is expected to place orders shortly for about 12 machines for shops in connection with its new by-product coke plant in Cleveland. An inquiry is pending from Pickands, Mather & Co., Cleveland, for a lathe grinder, drilling machine and hack saw for use at one of the ore mines. Complaint is still heard among dealers that with deliveries better their volume of sales would be much larger. While lathes are not as scarce as some time ago, owing to the fact that dealers are getting shipments on stock orders, some lathe builders and other machine-tool manufacturers are falling further behind on deliveries.

The Cleveland Co-operative Stove Company, Cleveland, having outgrown its present quarters and with no room for further expansion in the vicinity, has acquired a site on Harvard Avenue, on which it plans the erection of a continuous gray-iron foundry, 135 x 900 ft. A foundry about half this size will be built for the present with a view of making an extension later. Work will begin as soon as plans can be prepared and contracts placed.

The Cleveland Metalcraft Company, Cleveland, maker of metal furniture, will enlarge its plant by the erection of an extension about 60 x 60 ft. Some additional press equipment will be required.

The Peerless Motor Car Company, Cleveland, will place a contract shortly for the erection of three buildings for the manufacture of pleasure cars, allowing its present plant to be devoted exclusively to the manufacture of motor trucks. The plans provide for a three-story reinforced concrete building, 60 x 270 ft., a three-story building, 53 x 161 ft. for body making and chassis assembling, and a one-story building of the saw tooth type to be used for final assembling. Plans have been prepared by Ernest McGeorge, engineer, Leader-News Building, Cleveland.

The Guide Motor Lamp Mfg. Company, 11,400 Madison Avenue West, Cleveland, is planning the erection of a one-story addition, 50 x 120 ft.

The Dann Products Company, Cleveland, maker of automobile specialties, has had plans prepared for a one-story steel and brick factory, 101 x 301 ft., at 1084 East 152nd Street.

The Cleveland Copper & Brass Rolling Mills Company, Cleveland, has been incorporated with a capital stock of \$10,000 by H. J. Klosser, G. L. Branch, A. C. Altman, and others.

The Lake Erie Boiler Works Company, Cleveland, has been incorporated with a capital stock of \$10,000 by W. J. Keenan, Thomas E. Greene and others.

Clifford S. Goby and others are interested in the Motor Trucks Company, Cleveland, which has been incorporated with a capital stock of \$35,000.

The Grabler Mfg. Company, Cleveland, will enlarge its plant by the erection of a foundry building, 35 x 125 ft.

The Urbana Tool & Die Company, Urbana, Ohio, maker of jigs, fixtures and dies, has acquired the property formerly occupied by the Urbana Woolen Mill Company, consisting of a two-story building, 60 x 150 ft., which it will occupy as a manufacturing plant, and a small building, 50 x 50 ft., which will be used as a hardening department. The company has ordered additional equipment and will move into its new quarters at an early date. It started in business five years ago with two employees and now furnishes employment for 100 tool and die makers and expects to increase this number to 200 within the next few weeks.

The New York Blower Company is planning to build a new plant in Bucyrus, Ohio. A building 80 x 200 ft. is contemplated with provision for additional wings of the same dimensions.

The American Clay Machinery Company, Bucyrus, Ohio, will erect a new factory, 60 x 200 ft., in addition to remodeling the Shunk foundry plant which it recently purchased. It is stated that the company intends to remove to Bucyrus its foundry and clay-working machinery departments now located in Willoughby, Ohio.

It is reported from Bucyrus, Ohio, that the Kelly Motor Company will shortly be in the market for a double end punching and shearing machine with 30-in. throat, a $\frac{1}{2}$ -in.

riveting machine and a radial drilling machine for holes up to 2 in. in diameter.

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The Northern Boiler & Structural Iron Works, Appleton, Wis., specializing in paper and pulp mill equipment, is contemplating the erection of a new plant, the present quarters having been outgrown. Definite plans will not be made until a site is selected.

The Allis Chalmers Mfg. Company, West Allis, Wis., is having bids taken for a one-story shop addition, 50 x 350 ft. Klug & Smith, Mack Block, Milwaukee, are the architects.

The Spencer Sign Service Company, Rice Building, Stevens Point, Wis., electric signs and appliances, has moved to new and larger quarters in the former Shemanski shop at Portage and Union streets. Victor Prais and Spencer Swanwick are the owners.

William Heck, Kewaunee, Wis., has purchased a site on Clemont Street, Antigo, Wis., and will erect a public garage and repair shop costing \$8,000.

The Harvey Spring & Forging Company, maker of automobile and vehicle springs and forgings, is so crowded for room that tentative plans are being made for the erection of a new shop, probably 100 x 190 ft., one-story.

John M. Howarth, Wausau, Wis., has contracted with the Wausau Foundry & Machine Company for a small production of candy-pulling machines and confectioners' equipment, and later intends to establish a plant of his own.

The Cedarburg Foundry Company, Cedarburg, Wis., which recently passed into the control of Frank E. Walsh and E. M. Heid, West Allis, Wis., is now in operation and is pouring from 4 to 5 tons of metal daily.

The J. I. Case Plow Works, Racine, Wis., has purchased a site, 120 x 120 ft., adjoining its main office, and giving it possession of the entire block at Mead, Water and Sixth streets. No improvements are contemplated at this time.

The Mitchell Wagon Company, Racine, Wis., is enlarging its facilities to cope with the demand for automobile bodies for the Mitchell Motors Corporation, Racine. Additional operating room is being provided. The bodies are sheet-metal products.

The Quincy Garage & Supply Company, Hancock, Mich., has awarded contracts for a garage and machine shop, 60 x 110 ft., to be ready about Nov. 1.

The Up-to-date Auto Company, Prairie du Sac, Wis., is installing considerable machine-tool equipment and enlarging its force to handle custom machine work. The business is owned by David and Edward Gray.

Detroit

DETROIT, MICH., Sept. 11, 1916.

The past week registered unusual industrial activity in Detroit which will be reflected in the continued prosperity of the metal and machinery trades. Of greatest importance was the announcement of the Pennsylvania Lines that it would spend a large amount of money in entering Detroit and constructing a belt line parallel to the present Terminal Railroad. The company states that it will run cars from Toledo to Carleton, Mich., over the Pere Marquette lines, and from there to Detroit will construct a line of its own, in addition to the belt line to run around the city.

Confirmation of the announcement that it would spend many millions in duplicating its present plant has been made by the Ford Motor Company. The new factory is being constructed on land adjacent to the present plant. F. L. Klingensmith is general manager.

The Studebaker Corporation, South Bend, Ind., announces that practically all of the \$1,500,000 recently voted will be spent in Detroit in erecting new buildings. When the work is completed, additions to the Detroit plants will include machine shops, forging shops and assembling plants. At least 1000 more men will be employed and the output of the Studebaker plants at Detroit will be increased from 75,000 to 100,000 automobiles a year.

These three announcements mark the beginning of the fall industrial activity, and machinery men state that their business is already responding. Construction records for the past month show an increase of \$1,000,000 over the same month last year, and partially explains the unusual demand for wood-working machinery. Grinders and milling machines continue in demand. Deliveries are still from four to six months behind.

An investigation conducted by a Detroit newspaper this week showed that nearly all of the larger cities in the State are suffering from a lack of skilled labor, due to the inability to supply houses of any kind for the working men. Detroit, Jackson, Muskegon, Kalamazoo, Grand Rapids and Saginaw report the worst conditions. The larger factories in these cities are working day and night.

The Auto Traffic Signal Company, Detroit, will shortly begin the erection of a factory to manufacture the Roberts' auto traffic signal. W. C. Jewell, Ford Building, Detroit, is general manager.

Approximately \$1,000,000 was involved in a deal last week by which the Lozier Motor Car Company sold its property

at Mack Avenue and the Terminal Railroad to the Motor Products Company. Fifteen of the sixty acres purchased are covered by modern factory buildings. It is understood that the Motor Products Company, which was recently formed to take over the business of five manufacturers of motor car parts, will enlarge the factories which it has purchased, while the Lozier Company will use the money obtained in the sale in buying or erecting another factory.

J. A. Anderson, Grand Rapids, is forming a company and making plans for the erection of a factory for the manufacture of a four-cycle valveless motor. The Grand Rapids Association of Commerce is furthering the project, and a company capitalized at \$250,000 is being formed, with Beverly Deuel as secretary.

The Ideal Foundry Company, Grand Rapids, is to build a pattern shop, 40 x 100 ft., two stories, estimated to cost \$8,000.

The Valley City Chair Company, Grand Rapids, is planning the erection of a three-story factory at an estimated cost of \$60,000. It will be 60 x 300 ft.

The Grand Rapids Blow Pipe & Dust Arrester Company, Grand Rapids, is planning a new factory, 50 x 220 ft. Wernette-Bradfield-Mead are acting as engineers and architects.

E. E. Park & Son, engineers, are preparing plans for an addition to the plant of Eagle-Ottawa Leather Company, Grand Haven, Mich.

The Rich Twist Drill Company, Battle Creek, is constructing new buildings which will require the employment of 150 more mechanics.

The Vegetable Parchment Company, Kalamazoo, has announced plans for the erection of a new plant next summer to cost \$300,000.

The Kellar Tool Company, formerly of Fond Du Lac, Wis., will shortly begin the erection of a factory building in Grand Haven, Mich. It will be 90 x 300 ft., and will give employment to 200 mechanics.

The Standard Malleable Iron Works, Muskegon Heights, Mich., has increased its capital stock from \$100,000 to \$250,000, and will enlarge its plant as soon as labor is obtainable.

Construction of a sawmill has been begun by the Michigan Lumber Company, Manistee, Mich. Machinery will be installed at once.

The Detroit United Railroad announces the erection of a new freight station to cover three city blocks in Detroit. The plans for the new incoming and outgoing station provide for the most modern freight-handling equipment. Frank W. Brookes is president.

Indianapolis

INDIANAPOLIS, IND., Sept. 11, 1916.

The National Motor Vehicle Company, Indianapolis, Ind., has begun the erection of two additional buildings on a plot 140 x 410 ft. The structures will be 60 x 380 ft., three stories and 140 x 328 ft., one story, both of concrete, and will cost in all about \$150,000. It is expected the buildings will be completed by Nov. 9.

The Floyd County Veneer Mills, New Albany, Ind., has incorporated with \$10,000 capital to manufacture wood products. George B. Lapping, Guy W. Theiss and Robert A. Lapping are the incorporators.

R. H. Humphrey, Corydon, Ind., proposes to establish a factory in New Albany, Ind., to manufacture automobile, bed and wagon parts, consolidating existing plants at Corydon and DePauw, Ind.

The International Steam Control Company, Indianapolis, has been incorporated with \$25,000 capital stock to manufacture a steam-controlling device. The directors are Henry Langsenkamp, Cole Stickle and William Lightford.

The Universal Tool & Die Company, Indianapolis, has been incorporated with \$10,000 capital stock to carry on a general foundry and machine shop business. Charles J. McHugh, Edward W. Hohlt and Durward River are the directors.

The Superior Machine Tool Company, Kokomo, Ind., has increased its capital stock from \$180,000 to \$360,000.

Improvements to cost \$10,000 will be made to the substation at Hartford City, Ind., of the Muncie Lighting Company, including three new generators.

The O. K. Machine Company, Fort Wayne, Ind., has been incorporated with \$10,000 capital stock to manufacture machinery, machine tools, etc. The directors are Nestor Fries, Linus J. Johnson and Gustav W. Fries.

The Schlundt Motor Company, Evansville, Ind., has been incorporated with \$25,000 capital stock to manufacture automobiles. Jabez Woolley, Clarence A. Reitz and Arthur J. Schlundt are directors.

A two-story brick and steel addition, 32 x 135 ft., is being built to the plant of the Teetor-Hartley Motor Car Company, Hagerstown, Ind. It will give 8640 additional sq. ft. of floor space. The total improvements will cost about \$22,000.

The Willard F. Meyers Diamond Saw Company, Bedford, Ind., has increased its capital stock from \$6,000 to \$16,000.

The Central South

LOUISVILLE, KY., Sept. 11, 1916.

Dealers in mill and factory supplies are watching the car shortage situation with considerable apprehension. Railroads serving Kentucky and neighboring coal fields are doing little better than a two-day car service each week and many factories are dependent on this supply. Coal development projects in eastern Kentucky are numerous and equipment inquiries frequent. Electrical equipment manufacturers report prospects improving and deliveries easier, although a local motor manufacturer notes loss of an order worth \$6,000 on account of inability to make delivery inside of four months.

The Visible Measure Gasoline Dispenser Company, Louisville, has incorporated with \$40,000 capital to manufacture a gasoline-vending apparatus, with force pump and transparent measuring chamber. The device will probably be manufactured under contract at present. J. Henry Brady, William A. Earl and William A. Pell are incorporators.

N. B. Turpin, Irvine, Ky., has the contract to build an addition to the electric light plant and install additional machinery.

A. L. Carpenter and Ross Lucas, Uniontown, Ky., have sold the Home Lighting Company to an unnamed purchaser operating various western Kentucky properties. The plant will be improved.

S. Walton Forgy, Elkton, Ky., has purchased the Franklin Electric & Ice Company at Franklin, Ky., for \$62,000, for an unnamed client, who will expend \$13,000 in improvements.

The Roy C. Whayne Supply Company, Louisville, Ky., is in the market for manganese crushing rolls, 32 to 36 in. x 16 to 18 in.

The City Commission, Lexington, Ky., has passed a smoke prevention ordinance, which will become effective on Jan. 1, 1917.

The Lenox Saw Mill Company, Lenox, Ky., is asking for prices on three 150-hp. horizontal tubular boilers, with stacks and Dutch oven settings, 18 x 72 in.

The Little River Lumber Company, Townsend, Tenn., is installing power and machinery equipment at a cost of \$50,000 in its new mill, built to replace the one destroyed by fire. W. B. Townsend is president.

The Southern Locomotive Valve Gear Company, Knoxville, Tenn., has contracted for a factory to cost \$20,000, which will be equipped at a cost of \$50,000, to manufacture locomotive valve and power reverse gears. L. D. Tyson is president.

St. Louis

ST. LOUIS, MO., Sept. 11, 1916.

The machine-tool business, which showed a little hesitancy while the railroad strike threatened, resumed its stride toward the close of the week and is approximating the volume it has held for several months and which is quite satisfactory. Practically all the business is of the small-lot or single-tool order. Collections are good, while financial conditions remain easy, both as to investment and commercial funds.

The Knobnoster Electric Company, St. Louis, has been incorporated with a capital stock of \$20,000 by R. W. Morrison, W. S. McCall and Harry C. Loehr and will equip an electric light and power plant at Knobnoster, Mo.

The Broadway Motors Company, Broadway and Cass Avenue, St. Louis, has leased quarters for a garage, repair shop and salesroom. W. N. Morrison and A. M. Zerweck are the owners.

The Bowman-Blackman Machine Tool Company, St. Louis, has been incorporated with a capital stock of \$20,000 by Ralph B. Bowman, G. H. Blackman and H. H. Bowman to continue and enlarge an existing machine-tool business under the same name.

The Winter Garden & Ice Company, St. Louis, which will operate an ice skating rink and an ice-manufacturing plant has acquired its building and will proceed with the alterations and installation of about \$100,000 of equipment at once. H. W. Eddy is in charge.

The new beverage plant of the Anheuser-Busch Brewing Association, St. Louis, to be constructed at once, is to be equipped with machinery for a 24-hr. capacity of 2,000,000 pint bottles.

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The Harvey Spring & Forging Company, maker of automobile and vehicle springs and forgings, is so crowded for room that tentative plans are being made for the erection of a new shop, probably 100 x 190 ft., one-story.

John M. Howarth, Wausau, Wis., has contracted with the Wausau Foundry & Machine Company for a small production of candy-pulling machines and confectioners' equipment, and later intends to establish a plant of his own.

The Cedarburg Foundry Company, Cedarburg, Wis., which recently passed into the control of Frank E. Walsh and E. M. Held, West Allis, Wis., is now in operation and is pouring from 4 to 5 tons of metal daily.

The J. I. Case Plow Works, Racine, Wis., has purchased a site, 120 x 120 ft., adjoining its main office, and giving it possession of the entire block at Mead, Water and Sixth streets. No improvements are contemplated at this time.

The Mitchell Wagon Company, Racine, Wis., is enlarging its facilities to cope with the demand for automobile bodies for the Mitchell Motors Corporation, Racine. Additional operating room is being provided. The bodies are sheet-metal products.

The Quincy Garage & Supply Company, Hancock, Mich., has awarded contracts for a garage and machine shop, 60 x 110 ft., to be ready about Nov. 1.

The Up-to-date Auto Company, Prairie du Sac, Wis., is installing considerable machine-tool equipment and enlarging its force to handle custom machine work. The business is owned by David and Edward Gray.

Detroit

DETROIT, MICH., Sept. 11, 1916.

The past week registered unusual industrial activity in Detroit which will be reflected in the continued prosperity of the metal and machinery trades. Of greatest importance was the announcement of the Pennsylvania Lines that it would spend a large amount of money in entering Detroit and constructing a belt line parallel to the present Terminal Railroad. The company states that it will run cars from Toledo to Carleton, Mich., over the Pere Marquette lines, and from there to Detroit will construct a line of its own, in addition to the belt line to run around the city.

Confirmation of the announcement that it would spend many millions in duplicating its present plant has been made by the Ford Motor Company. The new factory is being constructed on land adjacent to the present plant. F. L. Klingensmith is general manager.

The Studebaker Corporation, South Bend, Ind., announces that practically all of the \$1,500,000 recently voted will be spent in Detroit in erecting new buildings. When the work is completed, additions to the Detroit plants will include machine shops, forging shops and assembling plants. At least 1000 more men will be employed and the output of the Studebaker plants at Detroit will be increased from 75,000 to 100,000 automobiles a year.

These three announcements mark the beginning of the fall industrial activity, and machinery men state that their business is already responding. Construction records for the past month show an increase of \$1,000,000 over the same month last year, and partially explains the unusual demand for wood-working machinery. Grinders and milling machines continue in demand. Deliveries are still from four to six months behind.

An investigation conducted by a Detroit newspaper this week showed that nearly all of the larger cities in the State are suffering from a lack of skilled labor, due to the inability to supply houses of any kind for the working men. Detroit, Jackson, Muskegon, Kalamazoo, Grand Rapids and Saginaw report the worst conditions. The larger factories in these cities are working day and night.

The Auto Traffic Signal Company, Detroit, will shortly begin the erection of a factory to manufacture the Roberts' auto traffic signal. W. C. Jewell, Ford Building, Detroit, is general manager.

Approximately \$1,000,000 was involved in a deal last week by which the Lozier Motor Car Company sold its property

at Mack Avenue and the Terminal Railroad to the Motor Products Company. Fifteen of the sixty acres purchased are covered by modern factory buildings. It is understood that the Motor Products Company, which was recently formed to take over the business of five manufacturers of motor car parts, will enlarge the factories which it has purchased, while the Lozier Company will use the money obtained in the sale in buying or erecting another factory.

J. A. Anderson, Grand Rapids, is forming a company and making plans for the erection of a factory for the manufacture of a four-cycle valveless motor. The Grand Rapids Association of Commerce is furthering the project, and a company capitalized at \$250,000 is being formed, with Beverly Deuel as secretary.

The Ideal Foundry Company, Grand Rapids, is to build a pattern shop, 40 x 100 ft., two stories, estimated to cost \$8,000.

The Valley City Chair Company, Grand Rapids, is planning the erection of a three-story factory at an estimated cost of \$60,000. It will be 60 x 300 ft.

The Grand Rapids Blow Pipe & Dust Arrester Company, Grand Rapids, is planning a new factory, 50 x 220 ft. Wernette-Bradfield-Mead are acting as engineers and architects.

E. E. Park & Son, engineers, are preparing plans for an addition to the plant of Eagle-Ottawa Leather Company, Grand Haven, Mich.

The Rich Twist Drill Company, Battle Creek, is constructing new buildings which will require the employment of 150 more mechanics.

The Vegetable Parchment Company, Kalamazoo, has announced plans for the erection of a new plant next summer to cost \$300,000.

The Kellar Tool Company, formerly of Fond Du Lac, Wis., will shortly begin the erection of a factory building in Grand Haven, Mich. It will be 90 x 300 ft., and will give employment to 200 mechanics.

The Standard Malleable Iron Works, Muskegon Heights, Mich., has increased its capital stock from \$100,000 to \$250,000, and will enlarge its plant as soon as labor is obtainable.

Construction of a sawmill has been begun by the Michigan Lumber Company, Manistee, Mich. Machinery will be installed at once.

The Detroit United Railroad announces the erection of a new freight station to cover three city blocks in Detroit. The plans for the new incoming and outgoing station provide for the most modern freight-handling equipment. Frank W. Brookes is president.

Indianapolis

INDIANAPOLIS, IND., Sept. 11, 1916.

The National Motor Vehicle Company, Indianapolis, Ind., has begun the erection of two additional buildings on a plot 140 x 410 ft. The structures will be 60 x 380 ft., three stories and 140 x 328 ft., one story, both of concrete, and will cost in all about \$150,000. It is expected the buildings will be completed by Nov. 9.

The Floyd County Veneer Mills, New Albany, Ind., has incorporated with \$10,000 capital to manufacture wood products. George B. Lapping, Guy W. Theiss and Robert A. Lapping are the incorporators.

R. H. Humphrey, Corydon, Ind., proposes to establish a factory in New Albany, Ind., to manufacture automobile, bed and wagon parts, consolidating existing plants at Corydon and DePauw, Ind.

The International Steam Control Company, Indianapolis, has been incorporated with \$25,000 capital stock to manufacture a steam-controlling device. The directors are Henry Langsenkamp, Cole Stickle and William Lightford.

The Universal Tool & Die Company, Indianapolis, has been incorporated with \$10,000 capital stock to carry on a general foundry and machine shop business. Charles J. McHugh, Edward W. Hohlt and Durward River are the directors.

The Superior Machine Tool Company, Kokomo, Ind., has increased its capital stock from \$180,000 to \$360,000.

Improvements to cost \$10,000 will be made to the substation at Hartford City, Ind., of the Muncie Lighting Company, including three new generators.

The O. K. Machine Company, Fort Wayne, Ind., has been incorporated with \$10,000 capital stock to manufacture machinery, machine tools, etc. The directors are Nestor Fries, Linus J. Johnson and Gustav W. Fries.

The Schlundt Motor Company, Evansville, Ind., has been incorporated with \$25,000 capital stock to manufacture automobiles. Jabez Woolley, Clarence A. Reitz and Arthur J. Schlundt are directors.

A two-story brick and steel addition, 32 x 135 ft., is being built to the plant of the Teetor-Hartley Motor Car Company, Hagerstown, Ind. It will give 8640 additional sq. ft. of floor space. The total improvements will cost about \$22,000.

The Willard F. Meyers Diamond Saw Company, Bedford, Ind., has increased its capital stock from \$6,000 to \$16,000.

The Central South

LOUISVILLE, Ky., Sept. 11, 1916.

Dealers in mill and factory supplies are watching the car shortage situation with considerable apprehension. Railroads serving Kentucky and neighboring coal fields are doing little better than a two-day car service each week and many factories are dependent on this supply. Coal development projects in eastern Kentucky are numerous and equipment inquiries frequent. Electrical equipment manufacturers report prospects improving and deliveries easier, although a local motor manufacturer notes loss of an order worth \$6,000 on account of inability to make delivery inside of four months.

The Visible Measure Gasoline Dispenser Company, Louisville, has incorporated with \$40,000 capital to manufacture a gasoline-vending apparatus, with force pump and transparent measuring chamber. The device will probably be manufactured under contract at present. J. Henry Brady, William A. Earl and William A. Pell are incorporators.

N. B. Turpin, Irvine, Ky., has the contract to build an addition to the electric light plant and install additional machinery.

A. L. Carpenter and Ross Lucas, Uniontown, Ky., have sold the Home Lighting Company to an unnamed purchaser operating various western Kentucky properties. The plant will be improved.

S. Walton Forgy, Elkton, Ky., has purchased the Franklin Electric & Ice Company at Franklin, Ky., for \$62,000, for an unnamed client, who will expend \$13,000 in improvements.

The Roy C. Whayne Supply Company, Louisville, Ky., is in the market for manganese crushing rolls, 32 to 36 in. x 16 to 18 in.

The City Commission, Lexington, Ky., has passed a smoke prevention ordinance, which will become effective on Jan. 1, 1917.

The Lenox Saw Mill Company, Lenox, Ky., is asking for prices on three 150-hp. horizontal tubular boilers, with stacks and Dutch oven settings, 18 x 72 in.

The Little River Lumber Company, Townsend, Tenn., is installing power and machinery equipment at a cost of \$50,000 in its new mill, built to replace the one destroyed by fire. W. B. Townsend is president.

The Southern Locomotive Valve Gear Company, Knoxville, Tenn., has contracted for a factory to cost \$20,000, which will be equipped at a cost of \$50,000, to manufacture locomotive valve and power reverse gears. L. D. Tyson is president.

St. Louis

ST. LOUIS, Mo., Sept. 11, 1916.

The machine-tool business, which showed a little hesitancy while the railroad strike threatened, resumed its stride toward the close of the week and is approximating the volume it has held for several months and which is quite satisfactory. Practically all the business is of the small-lot or single-tool order. Collections are good, while financial conditions remain easy, both as to investment and commercial funds.

The Knobnoster Electric Company, St. Louis, has been incorporated with a capital stock of \$20,000 by R. W. Morrison, W. S. McCall and Harry C. Loehr and will equip an electric light and power plant at Knobnoster, Mo.

The Broadway Motors Company, Broadway and Cass Avenue, St. Louis, has leased quarters for a garage, repair shop and salesroom. W. N. Morrison and A. M. Zerweck are the owners.

The Bowman-Blackman Machine Tool Company, St. Louis, has been incorporated with a capital stock of \$20,000 by Ralph B. Bowman, G. H. Blackman and H. H. Bowman to continue and enlarge an existing machine-tool business under the same name.

The Winter Garden & Ice Company, St. Louis, which will operate an ice skating rink and an ice-manufacturing plant has acquired its building and will proceed with the alterations and installation of about \$100,000 of equipment at once. H. W. Eddy is in charge.

The new beverage plant of the Anheuser-Busch Brewing Association, St. Louis, to be constructed at once, is to be equipped with machinery for a 24-hr. capacity of 2,000,000 pint bottles.

John Payton, Novinger, Mo., and others, who own mining property nearby, are reported in the market for coal-mining equipment and a power plant.

The National Machine Company, 914 Main Street, Kansas City, Mo., will equip a plant for the manufacture of fence guys. Lewis Alverson is manager.

The Greenlease Motor Car Company, Kansas City, Mo., will erect a garage and machine shop for repair work.

The Farmers' Gin & Seed Company, Emmett, Ark., has been incorporated with a capital stock of \$14,000 by J. I. Wade, Charles T. Faulkner, E. H. Hood and R. D. Smith and will equip a cotton compress and ginnery.

The Snowden Engineering Company, capital stock \$500,000, has been organized to equip a 600-hp. steam-driven electric plant at Cave Springs, Ark. G. H. Snowden, president and S. A. Farrell, secretary, are both of Kansas City, Mo.

M. B. Sanders, Little Rock, Ark., will install a central power and heating plant to cost \$15,000 at Little Rock College, Little Rock.

The Arkansas Buick Automobile Company, Little Rock, Ark., has been incorporated with a capital stock of \$15,000 by E. M. Rowe, president, and others, and will equip a repair plant, machine shop and garage.

The Shawnee Gas & Electric Company, Shawnee, Okla., will install two 3000-hp. and one 1000-hp. turbines with condensing apparatus, boiler feed pumps and boilers. Plans are being made for additional horsepower later.

The Hickory Coal Company, Tulsa, Okla., Henry Adamson in charge, will rebuild and re-equip its powerhouse burned with a loss of \$10,000.

The Western Flint Glass Company, Checotah, Okla., has been incorporated with a capital stock of \$15,000 by George J. Miller, T. G. McDaniel and Maryetta Miller and will install machinery for the manufacture of bottles.

The Bristow Garage, Bristow, Okla., has been burned with a loss of \$20,000, of which \$5,000 was on machine-shop equipment, which will be replaced and the garage rebuilt.

The Sterling Sales Company, Tulsa, Okla., is reported in the market for one 300-kw. transformer and about 300 small transformers, of 110 and 220 volts, primary, with 11 and 22 volts secondary, respectively. L. A. Fitzer is general manager.

The McMahon Refining Company, Jennings, Okla., is reported in the market for stills of 100 and 200 bbl. capacity.

The West Point Handle & Lumber Company, West Point, Miss., will erect a handle factory near Columbus, Miss.

Robert A. Griedry, Hayes, La., is reported in the market for wood-working equipment for the manufacture of automobile wheel spokes and similar products.

The Gulf Refining Company, main office Pittsburgh, Pa., will equip an oil distributing plant at Lake Charles, La., including a pumphouse.

E. L. Vinet, Crowley, La., has leased his fully equipped machine shop and plans to build a larger one, 50 x 100 ft.

Texas

AUSTIN, TEX., Sept. 9, 1916.

Machinery and tool trade conditions in Texas and the Southwest, both present and prospective, are highly satisfactory. Money from the cotton crop is rapidly finding its way into general circulation, and this as well as other favorable factors, is having a stimulating effect upon business and the industrial situation.

Shortly before the war started the Texas Power & Light Company, Dallas, entered into a contract with the city of Denison to construct and have completed by Dec. 31, 1916, a new power station to cost not less than \$400,000. It is now announced that on account of the unfavorable condition of the money market the company will be unable to construct the plant within the agreed time. It will ask the City Council to enter into a new contract whereby it shall be stipulated that a power station to cost from \$750,000 to \$1,000,000 shall be erected on Red River within three years. The company has tentatively decided to construct a large power generation station at Austin for supplying power for an extension of its transmission line to that city and thence to San Antonio.

The Borderland Sugar Corporation of New York, which has just increased its capital stock from \$500,000 to \$2,000,000, will make improvements to its sugar mill at San Benito.

The American Petroleum Company has begun grading the site for its proposed new oil refinery which is to be located on the Ship Channel near Houston. It is planned to lay a

pipe line from the refinery to the Sour Lake field. It will also be connected with the Humble and other Gulf coast fields. The plant will cost about \$2,000,000. J. S. Cullinan is in charge.

The Wichita Valley Refining Company, Iowa Park, will make improvements and additions to its plant, including the installation of a 500-bbl. agitator. The present capacity of the plant is 1000 bbl. per day.

Birmingham

BIRMINGHAM, ALA., Sept. 11, 1916.

The machinery trade has improved considerably in the past few weeks and now shows a healthy demand all around. Hydroelectric apparatus for the new graphite mining field in Clay County, Ala., is especially active. Lumber mills are ordering more supplies and gasoline engines are on the active list. Collections are good. High prices will make up for the loss in crop yields.

The Foley Stave Company, Troy, Ala., will build a stave factory on a site recently obtained.

The Hillsboro Lumber Company, Tampa, Fla., has been incorporated by J. L. Greer, Greer, Fla., A. H. McFarlan, and others, with a capital stock of \$100,000.

The Howard Transportation Company, Fort Lauderdale, Fla., it is reported, will increase its capital to \$1,000,000 and build docks and other terminal facilities on inland waterways.

The Hillyer, Spearer & Dunn Company, Jacksonville, Fla., has been organized with a capital stock of \$200,000 to manufacture schooners, lighters, barges and other vessels. Four four-masted schooners are under contract.

San Francisco

SAN FRANCISCO, CAL., Sept. 5, 1916.

Machinery business in general has been greatly interrupted during the last fortnight by apprehension of a railroad strike, but with the immediate danger over a large volume of business is waiting to be placed. Notwithstanding some unfavorable features which cannot be lost sight of, the total of bank clearings in San Francisco for August surpassed the former high record, made last May, by some \$8,000,000; the total being \$287,323,010. The foreign trade department of the Chamber of Commerce has compiled figures showing the total exports from San Francisco for 1915, amounting to \$79,731,268, a gain of 100 per cent over 1910.

Machine-tool houses report a fairly good general demand, with increasing inquiries from the small shops, which have had a busy summer. Many are still holding off, intending to buy when prices recede. Orders from mining districts are falling off, as the season of curtailed operation is approaching; but work is being rushed for deliveries to interior Alaska and the mountain districts. Implements and irrigation equipment are in strong demand, and some large orders have been placed for rice and bean cleaning machinery both for the Orient and local use. Several new shipbuilding contracts are reported. Power equipment, electric, steam and gas, continue in steady demand.

The Columbia Steel Company is planning to add another open-hearth furnace to its steel casting plant at Pittsburg, Cal., and several new cranes are to be installed.

The Moran Meat Packing Company is negotiating for a 10-acre site in Oakland.

The San Diego Gas & Electric Company, San Diego, is building a garage and machine shop, and will put in a new gas generating and lampblack drying plant.

The School Board, San Mateo, Cal., is considering the addition of a foundry, forge and machine shop to the manual training department in the high school.

The Pacific Gear & Tool Works, San Francisco, has had plans drawn for a two-story machine shop to be added to its plant on Folsom Street.

The National Mill & Lumber Company has secured a permit to build a wood-working plant on the tidal canal near High Street, Oakland.

The principal improvement work to be done in Yosemite Valley in the near future will be the construction of a 750-hp. hydroelectric plant to cost about \$100,000.

The Board of Public Works, San Francisco, has awarded contracts for machinery for the Cherry Creek power station of the Hetch Hetchy project, the power to be used for construction work. The Pelton Water Wheel Company will supply the hydraulic equipment and the generators will be furnished by the General Electric Company.

The Diamond Match Company has announced plans to double its factory at Chico, Cal., with an expenditure of about \$100,000 for new machinery.

The Regan Forge & Engine Company is building a forge and machine shop on Smith's Island, in Los Angeles Harbor. A 25-ton steam hammer will be installed now, with provision for a cupola later.

The Santa Fe Railroad has placed a contract in Los Angeles for the construction of a 34-stall roundhouse at Las Vegas, N. M. The plant will include a machine and blacksmith shop and powerhouse. W. M. Catlin, Los Angeles, is local purchasing agent.

The Yuba Construction Company, Marysville, Cal., will install a pumping plant for Reclamation District 1600 at Woodland, Cal.

The Galigher Machinery Company, Salt Lake City, Utah, has purchased property and will erect a new plant.

The Ogden Iron Works, Ogden, Utah, has been incorporated with a capital of \$100,000 by Joseph Scowcroft, Marriner Browning, R. B. Porter and L. T. Dee. It will absorb the Western Foundry & Machine Company and will erect a plant on the ground occupied by the latter company.

The Pacific Northwest

SEATTLE, Sept. 5, 1916.

For the first time in months, lumber production for the past week registered normal in Washington and Oregon. It is claimed this does not mean an abandonment of the individual mill principle of curtailment, so much as it does a policy of preparedness, mill crowding through urgent orders in anticipation of the interruption of traffic. Shipments by rail, while slightly increased, are still considerably below production, due to severe car shortage in Oregon. While the volume of orders has been encouraging, the level of values is somewhat discouraging from the mill standpoint.

Frank Waterhouse & Co., Seattle, shippers, have recently chartered five cargo steamships to ply between Seattle and Vladivostok and ports in Japan and China. The vessels will take a total of 33,000 tons of cargo.

The Matthews Shipbuilding Company, Hoquiam, Wash., has recently received contracts for two wooden motor vessels for the W. R. Grace Company, to have a lumber-carrying capacity of 2,000,000 ft. each and will be equipped with motors of the internal combustion type.

Announcement is made that the Northwest Steel Company and the Willamette Iron & Steel Works, Portland, have closed contracts for two additional steamships to be built for Lauritz Kolster, Stavanger, Norway, at a cost of \$1,000,000 each. This makes a total of seven vessels contracted for by the two companies.

The Valveless Engine Corporation, Spokane, Wash., George Chandler president, contemplates the construction of a plant to manufacture a new type of engine.

Lou S. Smith of the Oregon-Washington Railroad & Navigation Company is at the head of a project to install a lime plant in the vicinity of Ilwaco, Ore. Machinery for the plant will be ordered immediately, and is to be in operation by Nov. 1.

The Southern Pacific Company, it is reported, plans the establishment of shops, roundhouse, etc., in Eugene, Ore.

The Moscow Fire Brick & Clay Products Company, Moscow, Idaho, has obtained a 25-year lease on a site on which a 20,000 brick plant will be constructed, to make fire and face brick exclusively. It will have a capacity of 35,000 bricks every 10 hr. and will cost about \$35,000.

The American Can Company, Portland, Ore., plans extensive improvements to the local factory to cost about \$7,000.

The Idle Gilbert Hunt Mfg. Company plant in Walla Walla, Wash., one of the largest threshing machine factories in the Northwest, is to be reopened. J. D. Morris, W. A. Toner and others are promoting the project. It is estimated that \$50,000 will be required to put the plant in operation.

The Alaska Steamship Company, Seattle, operating between Seattle and Alaska, plans the construction of three passenger liners and the purchase of four cargo vessels at a cost of more than \$3,000,000. The latter will be 350 ft. long.

The Columbia Engineering Works, Linton, Ore., plans the construction of a shipbuilding plant in Portland. It now has a contract for a 1000-ton schooner.

The Belmont-Banner Mining Company, Spokane, plans the installation of an air compressor, hoist and pumps at its properties on Beaver Creek.

The D & M Vulcanizer Mfg. Company, Walla Walla, Wash., plans to establish a manufacturing plant.

Myrtle Creek, Ore., voted \$27,000 for a municipal light and water plant. A hydroelectric power plant of 180 hp. or more is planned.

Canada

TORONTO, Sept. 11, 1916.

The Dominion Steel Products Company, Brantford, Ont., has commenced the erection of a plant, in which it will install the latest type of machinery for the manufacture of shells. A permit has been granted the company for the erection of a machine shop to cost \$2,000.

The British Canadian Nickel Company, which will erect a plant at Sudbury, Ont., will develop its own hydroelectric power.

The American Brake Shoe Company, St. Thomas, Ont., will install equipment so as to operate all its machinery by electric motors.

Armour & Co., Chicago, Ill., has called for tenders for the erection of a four-story packing and powerhouse on Craig Street, Montreal, of brick and reinforced concrete construction. R. C. Clark, Chicago, Ill., is the architect.

The Feldspar & Clay Products, Ltd., recently incorporated with a capital stock of \$1,500,000, has purchased the plant and property of the Crown Portland Cement Company at Wiarton, Ont. The company will manufacture potash.

The Abitibi Power & Paper Company, Montreal, has decided to double the capacity of its paper plant, and financial arrangements have been completed. The company's projected output of news print will be about 400 tons a day.

The Maple Leaf Tire Company, Belleville, Ont., has commenced the construction of a new plant just outside the city limits. The cost will be \$100,000.

The International Land & Lumber Company, Ottawa, will erect a 100-ton pulp mill on the Ashuapmash River in the Lake St. John district. Among those interested in the company are J. L. Bate, R. N. Bate and Thomas Asquith, all of Ottawa.

D. B. McDonald, Winnipeg, promoter of the Manitoba Power, Pulp & Paper Company, states that plans have been prepared for its plant to be erected at Grand Rapids on the Saskatchewan River. It will include a sawmill, paper factory, pulp mill and hydroelectric power plant. The capacity of the pulp and paper mills will be 100 tons per day. The whole scheme will represent an outlay of \$2,000,000.

Thorold, Ont., proposes to purchase a new pump and motor at a cost of \$4,500. D. J. C. Munro is clerk.

The Automobile Club of Canada, Montreal, has had plans prepared for the erection of workshops, garage and club house to cost \$1,000,000. G. A. McNamee, 909 New Birks Building, Montreal, is secretary.

The Northern Pacific Railway, 34 Nassau Street, New York, is having plans prepared for freight terminals at New Westminster, B. C.

S. L. Yolles, 67 Baldwin Street, Toronto, will erect a garage to cost \$20,000.

The Canadian Pacific Railway Company has let contract for the erection of a powerhouse and other buildings at McAdam, N. B., to Henry Post, Woodstock, N. B., at a cost of \$28,000.

The contract has been awarded for the erection of a roundhouse at McLennan, Alta., for the Edmonton, Dunvegan & British Columbia Railway.

Lymburner, Ltd., 360 St. Paul Street, East, Montreal, manufacturer of brass castings, etc., will build a reinforced concrete addition at a cost of \$12,000.

William Davies, Ltd., 521 Front Street East, Toronto, has let contract for abattoir buildings to the Wells Brothers Company of Canada, 96 Gould Street, Toronto. The approximate cost of the plant to be \$500,000.

The general contract for erecting a machine shop for the Russell Motor Car Company, 276 King Street, West, Toronto, has been awarded to the Deacon Construction Company, Weston, Ont., at a cost of \$40,000.

Chatham, N. B., will purchase a semi-Diesel oil engine, direct-connected to dynamo and exciter, to cost \$13,600. P. J. McIntyre is clerk.

The Martin Aeroplanes, Ltd., Windsor, Ont., has been incorporated with a capital stock of \$100,000 by Charles S. King, William R. Bond, Oscar F. Flemming of Windsor, Ont.; Walter L. McGregor of Ford, Ont., and others to manufacture aeroplanes, motors, parts, etc.

Keenan Brothers, Ltd., Owen Sound, Ont., are in the market for an automatic shingle saw.

William Lee, Ltd., Montreal, has been incorporated with a capital stock of \$200,000 by William Lee, James F. Miller, Hugh Wylie and others to manufacture musical instruments, gramophones, etc.

The Rapid Tool & Machine Company, Ltd., Lachine, Que., has been incorporated with a capital stock of \$40,000 by John MacNaughton, James G. Cartwright, N. Bogue and

others, all of Montreal, to manufacture gages, tools, machinery, etc.

Negotiations have been closed whereby the Partridge Rubber Company of Montreal has purchased the business and plant of the Standard Tire & Rubber Company of Guelph, Ont., for about \$150,000.

The Stern Tire & Tube Company of Canada, Toronto, has been incorporated with a capital stock of \$1,000,000 by James L. Ross, 20 King Street East; Arthur S. Macrae, 123 Tyn-dall Avenue; Douglas J. MacLean, West Hill, Toronto, and others.

The Central Canada Stone Company, Ltd., Toronto, has been incorporated with a capital stock of \$100,000 by Britton Osler, 801 Dominion Bank Building; James B. Taylor, 78 Belhaven Road; Charles L. Valens, 516 Brunswick Avenue and others.

The Port Hope Sanitary Mfg. Company, Ltd., Toronto, has been incorporated with a capital stock of \$1,250,000 by Britton Osler, 801 Dominion Bank Building; Wellington A. Cameron, 59 Grenville Avenue; Byron B. Spence, 15 Constance Avenue and others, to manufacture furnaces, stoves, boilers, plumbers' supplies, etc.

The Dominion Building Products, Ltd., has been organized with head office at Galt, Ont., and will begin the erection of a plant there in a few weeks. It will also erect plants at Toronto, Owen Sound, Sudbury and Picton. Among those interested in the new company are David D. Williams, 263 Christie Street, Toronto; W. J. Heron, Galt, Ont., and John T. Jackson. The company will manufacture sand brick by a process invented by John T. Jackson of Toronto.

Damage amounting to \$20,000, which was done to the furnace room and machine shop of the St. Thomas Construction Company, St. Thomas, Ont., Sept. 5, will be repaired immediately.

English capitalists under Sir Robert Perks have taken over the plant of the New Brunswick Pulp & Paper Company at Millerton, N. B., and will rebuild it on a larger scale.

The Ontario Paper Company, Thorold, Ont., has let contract for an addition to its plant and machine shop.

Plans are being prepared for a factory building to be erected at New Toronto by the DuPont Fabrikoid Company, 120 Broadway, New York, estimated to cost \$150,000. W. A. Cotton is manager.

Government Purchases

WASHINGTON, D. C., Sept. 11, 1916.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, until date not set, schedule 109, five portable radial drilling machines for Newport; schedule 112, two 6-ft. radial wall-type drilling machines for Puget Sound; schedule 115, two 36-in. tool grinding machines for Philadelphia; schedule 130, one 3-in. plain radial drilling machine, one 16-in. high-speed sensitive drilling machine, one 2-wheel emery grinding machine, one portable drilling machine and one surface grinding machine, three motor-driven screw cutting lathes, one universal milling machine and one 24-in. extension base tool-room shaping machine, all for Brooklyn.

NEW TRADE PUBLICATIONS

Electric Hoists.—Shepard Electric Crane & Hoist Company, Montour Falls, N. Y. Bulletin No. 1501. Refers to an electric hoist for use where travel close to the ends of the runways is an essential feature. Among the installations for which it is particularly adapted are short-span I-beam cranes, jib cranes and short stationary runways. An engraving of the hoist itself and one of it installed on a plain trolley are included. If desired the hoist can be furnished in the geared trolley type.

Taps and Dies.—Standard Tool Company, Cleveland, Ohio. Catalog No. 22. Lists an extensive line of taps and dies, twist drills, reamers, milling cutters, chucks, taper pins and special tools. Illustrations and brief description are given and a number of tables of sizes are included.

Shearing and Rod Cutting Machine.—W. W. & C. F. Tucker, 516 Asylum Street, Hartford, Conn. Catalog No. 1. Calls attention to a line of bench shearing and rod cutting machines. Illustrations and brief descriptions of the several sizes of machines are presented, followed by a general description of them and tables of the capacities and dimensions of each.

Judicial Decisions

ABSTRACTED BY A. L. H. STREET

BREACH OF SPECIAL MANUFACTURING CONTRACT.—The general rule of law that the measure of damages for breach of a contract to accept delivery of articles contracted to be bought is the excess of the contract price above the market value of the articles in the hands of the aggrieved seller, being inapplicable in a case where machinery specially manufactured has no market value, the manufacturer is entitled to recover the full contract price. (United States Circuit Court of Appeals, Second Circuit, Fisher Hydraulic Stone & Machinery Company vs. Warner, 233 Federal Reporter, 527.)

INJURY TO YOUTHFUL EMPLOYEES.—The New Jersey workmen's compensation act does not apply to injuries sustained by a child under 14 years of age in the course of his employment in violation of a law limiting the age of employees, and an ordinary action at law based on the employer's common-law liability may be maintained. (New Jersey Court of Errors and Appeals, Hetzel vs. Wasson Piston Ring Company, 98 Atlantic Reporter, 306.)

VIOLATION OF SUNDAY LAWS.—An owner of a manufacturing establishment who is present while it is being operated on Sunday, overseeing the work, as usual, is guilty of violating the law against performance of unnecessary labor on the Sabbath, although he may perform no manual labor. Nor may he justify himself on the ground that he observes another day of the week as the true Sabbath, if the operations of the factory disturb other persons in the neighborhood. (New York Supreme Court, Appellate Division, People vs. Adler, 160 New York Supplement, 539.)

A PHASE OF CONDITIONAL SALE.—In a suit by the seller of an article to recover possession under a clause of the contract of sale reserving title in him until payment of the price, the defendant buyer is entitled to set up a claim to damages for breach of warranty as to the condition of the article, to reduce or extinguish the seller's claim for a balance due on the agreed price. (New York Court of Appeals, Peuser vs. Marsh, 113 Northeastern Reporter, 494.)

ASSIGNMENT OF BOOK ACCOUNTS.—In Pennsylvania, title to book accounts cannot pass by assignment unless there is either written assignment or its equivalent. Should the same accounts be assigned to two different parties, the first to give notice to the debtors takes the prior right to collect them. (United States District Court, Eastern District of Pennsylvania, In re Hawley Down-Draft Furnace Company, 233 Federal Reporter, 451.)

FREIGHT AND DEMURRAGE CHARGES.—A railroad company's acceptance of a payment as covering all charges accruing on a shipment of steel and surrender of the shipment does not preclude it from claiming a balance actually due under its published schedules for unloading and storage, although lien against the property is thereby lost. (Delaware Court of Chancery, In re Arlington Hotel Company, 98 Atlantic Reporter, 186.)

DELIVERY OF FREIGHT TO CONSIGNEE.—Freight will be deemed to have been delivered to the consignee, so as to discharge the carrying railroad company from liability, when it appears that possession has been turned over to a transfer company authorized to receive all freight addressed to the particular consignee, although the latter may refuse to accept actual delivery from the transfer company. (Arkansas Supreme Court, Yazoo & Mississippi Valley Railroad Company, 187 Southwestern Reporter, 656.)

TRAVELING SALESMEN AND THE NEW YORK COMPENSATION ACT.—A traveling salesman is not entitled to an award under the New York workmen's compensation act for injury sustained while riding in a public conveyance from one place to another in the transaction of his employer's business; that not being a hazardous occupation within the meaning of the act. (New York Supreme Court, Appellate Division, Mandle vs. A. Steinhardt & Bro., 160 New York Supplement, 2.)

